

## SECTION 5

### MECHANISM SERVICE TECHNICAL INFORMATIONS

#### 1. OUTLINE OF '94 MIDI MID-MOUNT MECHANISM

The '94 Midi mid-mount mechanism is used for video tape recorders shipped as new products of 1994. The '94 Midi mid-mount mechanism has the same basic structures as the P90 mechanism shipped in 1990 except the following. As this manual omits the description of parts which are the same as those of P90, please refer to the P90 Mechanism Service Technical Information.

**Note:** (9) to (11) of the followings have already been changed in the "P91 mechanism" and repeated in "Service Technical Information of P91 mechanism".

- (1) Some models have new reel drive system parts (supply reel table, take up reel table, reel gear (S), reel gear (T), COMPL idler clutch). As these are not interchangeable with the older ones, be sure to check the parts list when replacing them.
- (2) The main cam gear, load rack and load gear (T) have been replaced with new ones to further simplify the tape loading mechanism. Therefore, the load cam lever of the old mechanism is not required. The new tape loading mechanism is shown in the figure 2-1.
- (3) The MC-2 and MC-3 boards between the loading motor and system control circuit have been replaced with new ones. The gilt side of its MC-2 board is marked "T-MONO" in big letters. Its CN811 connector has 22 pins. VHJ-0104 is used as the relay board.
- (4) The pulley bracket is no longer used and the special screw has been employed. [However, the pulley bracket is stil used in the P90 S VHS mechanism (P91 High speed FF/REW mechanism)]
- (5) The shape of the clutch lever assembly has been partially changed and the damper is no longer used.
- (6) The shape of the front helical gear of the loading motor has been partially changed and the washer is no longer used.
- (7) The 4 screws for mounting the gear bracket assembly of the cassette holder mechanism have been reduced to 3 screws.
- (8) Some models do not have the impedance roller.
- (9) The height adjustment of the exit side fixed guide no longer required as the precision of the tape running system has been heightened.
- (10) The form of MC-1 and MC-4 board connector (CN801) near the reel drive part has been changed.
- (11) The auto head cleaner mechanism is used for cleaning the video head automatically during loading and unloading.

## 2. DESCRIPTION OF MECHANISM OPERATION

### 2-1. BASIC OPERATION MODE OF MECHANISM

The P-90 mechanism has its original modes such as given in Table 2-1, in addition to the VTR is operation modes (STOP, FF, REW, PLAY, REC, R-SEARCH, F-SEARCH, STILL, SLOW, and ETS). These modes specific to the mechanism play important roles in tape protection operation at the time of a shift to various modes of the VTR above. A shift

to the mode specific to the mechanism is carried out by controlling the rotation of the loading motor with the control signal of the system control circuit. The detection of important mechanism operation mode positions is done by using the FL START SWITCH for detecting the cassette ejection/insertion, and the MECHANISM MODE SWITCH for detecting each mode of the mechanism (3 bit MODE DATA is output by operating the rotary switch).

Mechanism Mode	Mechanism Mode Switch			HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode
	3	2	1				
EJECT	-	-	-		Eject position	Detected by FL start switch	EJECT
					Front loading/Unloading	← Cassette insertion through STOP or PLAY mode	
						STOP from EJECT →	
SHORT REW	1	1	0		Take up operation in the tape end position	← Pre-rolling after detecting tape end with tape end sensor.	Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position	Power ON → OFF when the cassette is inserted completely.	Power off when tape is loaded completely
					Tape unloading position		
					Tape loading		
					Tape loading ending position		
BRAKE	0	0	1	①	Main brake applying position	From PLAY to STOP	
						From FF/REW to STOP	
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)		STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.		STILL, SLOW, F-ADV
PLAY	1	0	0	④	From FWD direction Normal running mode		PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position		PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH

Table 2-1

## 2-2. DESCRIPTION OF MECHANISM DRIVE

To realize the thin type mechanism, a loading motor and two pieces of cam (MAIN CAM GEAR and the MODE CAM GEAR) to be driven by the said motor are mounted on the upper part of the capstan motor, that was a dead space in the conventional mechanisms hitherto available, with a view to optimization of parts mounting layout. (Fig. 2-1 and Fig. 2-2.)

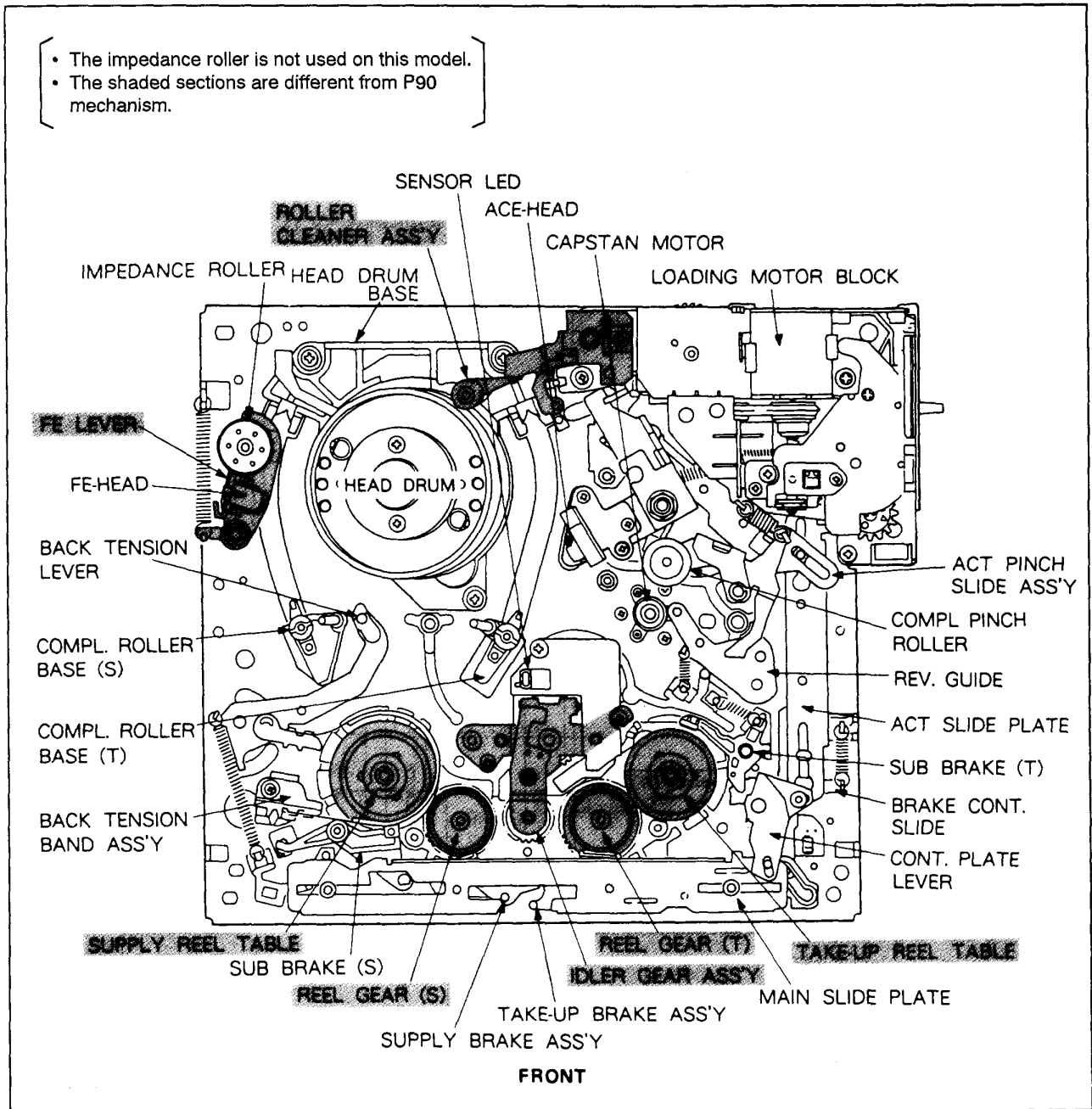
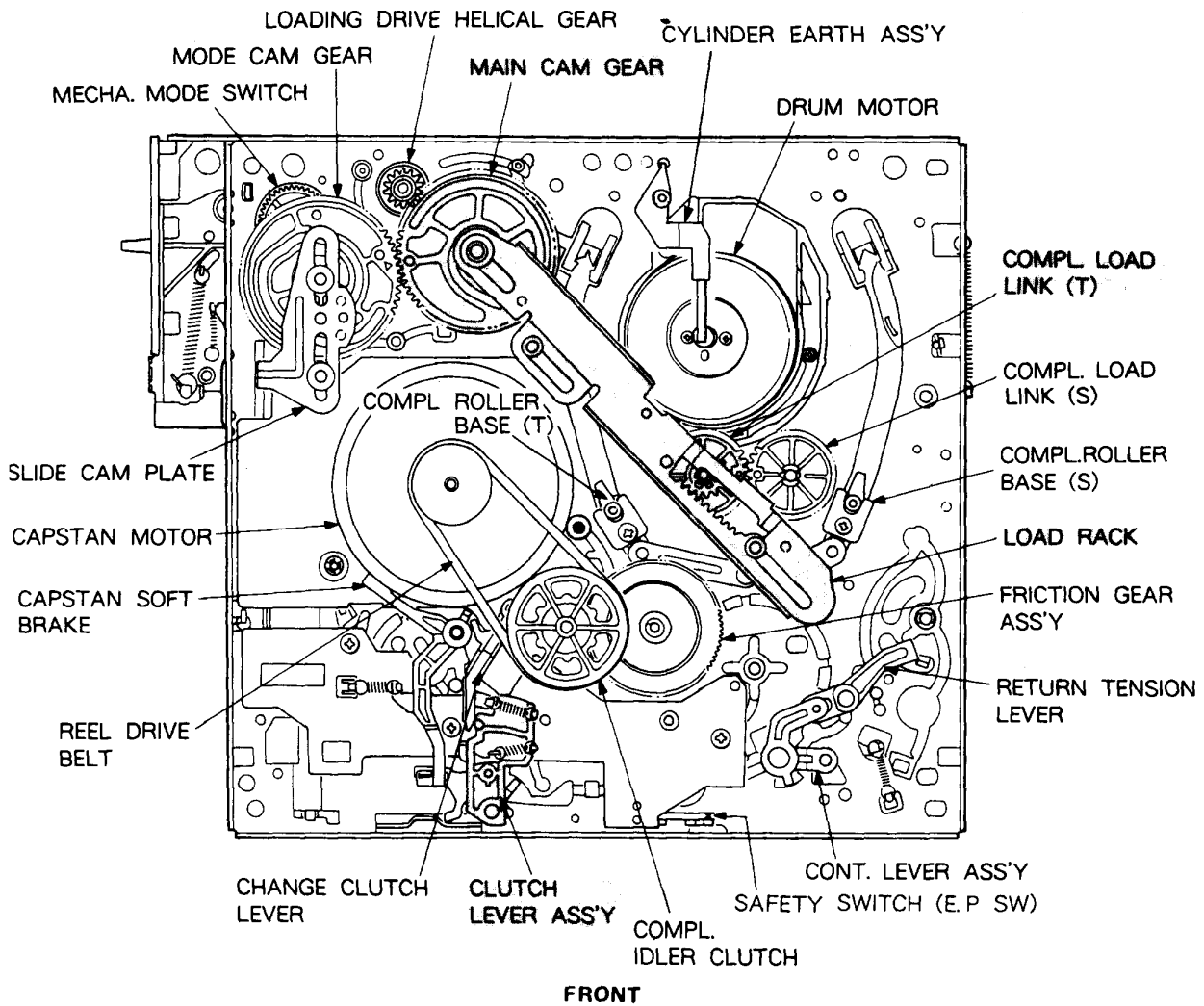


Fig. 2-1. Top View of Mechanism (Initial mode)

- Some models do not have the capstan soft brake.
- The shaded sections are different from P90 mechanism.



**Fig. 2-2. Bottom View of Mechanism (Initial mode)**

These two cams have one CAM GROOVE on both sides. A total of four CAM GROOVES performs independent functions to meet the multi-function needs of these days by driving the elements of a wide variety of functions with the motor precisely controlled by a microcomputer.

The two cams are positive motion cams having a groove over 570 degrees. These cams cause the amount of lift to be changed by a mild gradient according to the angle of rotation while synchronizedly being rotated by an outer circumferential gear to alleviate the load exerted on the cams when driving the rod linked with the cams and also to ensure position stability in each mode of operation. The geometry of each cam and that of a metal fitting of the drive section are shown in Fig. 2-3 and Fig. 2-4, respectively. Also, the role of each cam used is described below.

On the GROOVE 3 side of MODE CAM GEAR have a small gear.

This small gear is engaged with the MECHANISM MODE SWITCH as shown in Fig. 2-3., and detect the mechanism operation mode. In this way, the two cams and the MECHANISM MODE SWITCH are rotated synchronously, and the mechanism is fully synchronized and driven for each mode.

- MAIN CAM GEAR : CAM GROOVE 1.  
Pinch roller pressing operation
- CAM GROOVE 2.  
Tape loading mechanical drive
- MODE CAM GEAR : CAM GROOVE 3.  
Brake and clutch selecting operation
- CAM GROOVE 4.  
Brake control and front unloading control

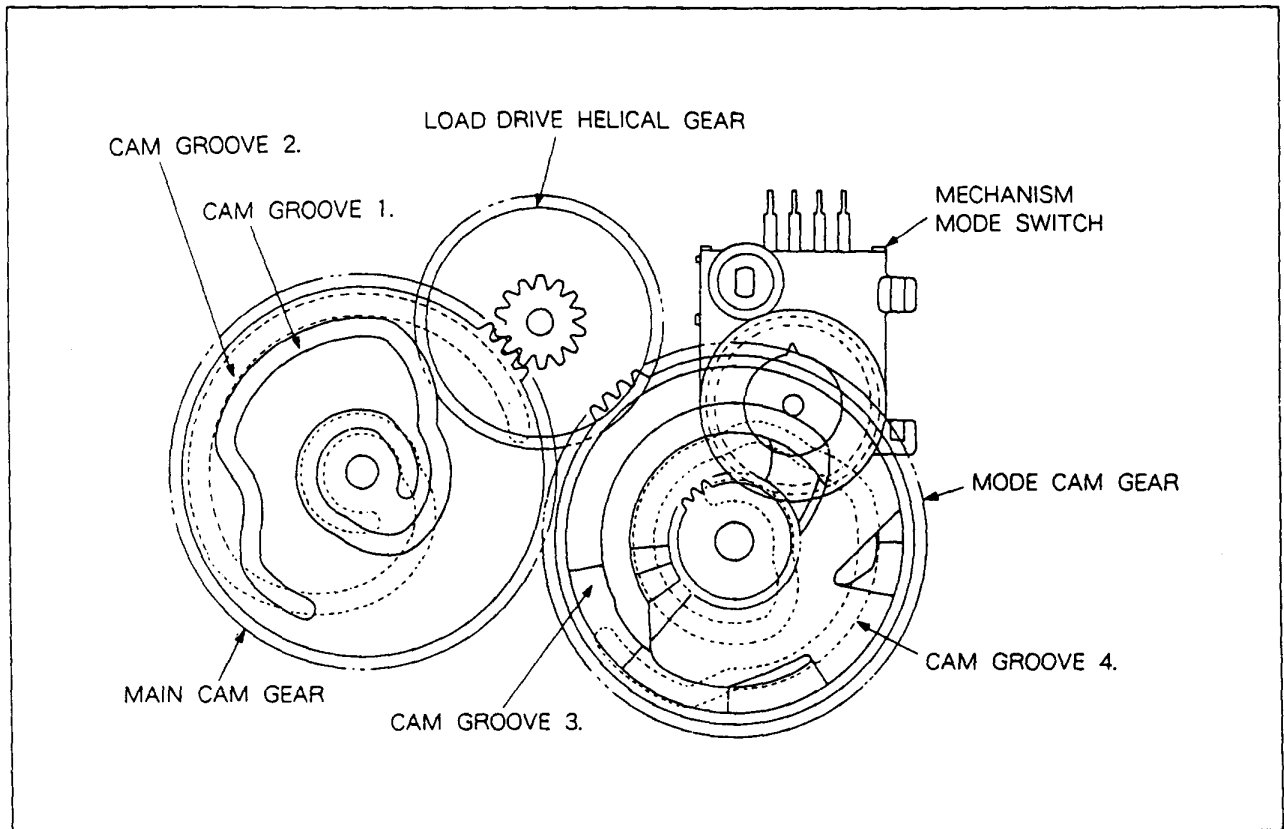
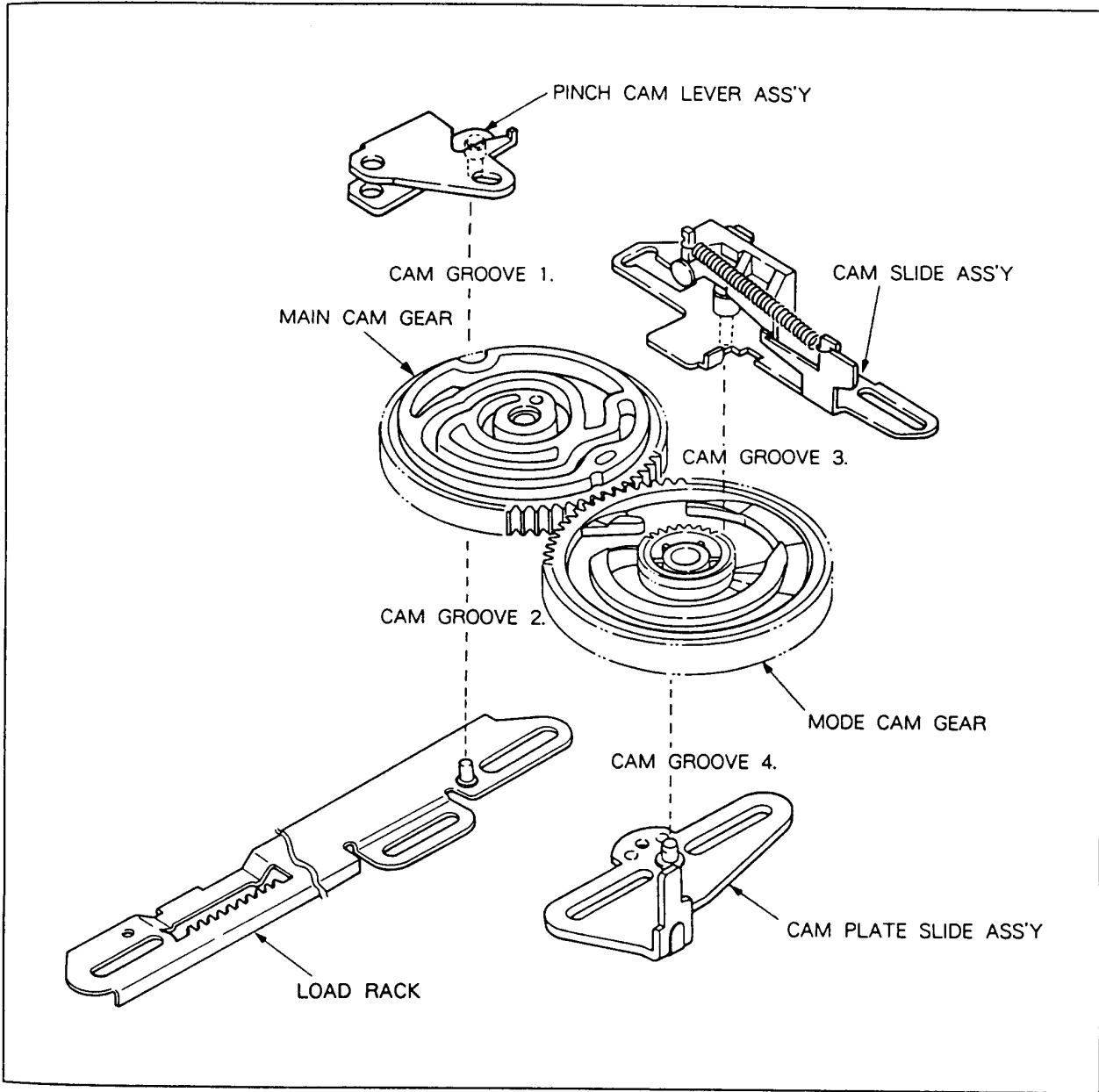


Fig. 2-3 PLAN OF CAMS CONSTRUCTION



**Fig. 2-4. View of Cams Construction**

### 2-2-1. Tape Loading Mechanism

The tape loading mechanism is compactly designed with use of a LOAD RACK for loading by drive from the before-mentioned MAIN CAMS with CAM GROOVE 2. The LOAD RACK is laid on the dead space in between the DD capstan motor and the head motor for effective space utilization. (Fig. 2-5) The process from tape pull-out upon loading to

contact of the leading guide section with the stopper of drum base and press-fitting under tension of spring is guided and driven in such a manner that the rod is drawn inward from the outer circumferential direction of the CAM GROOVE 2, thereby reducing the load torque (PV value) to the CAM GROOVE. And, the load of the loading motor is minimized to enhance reliability.

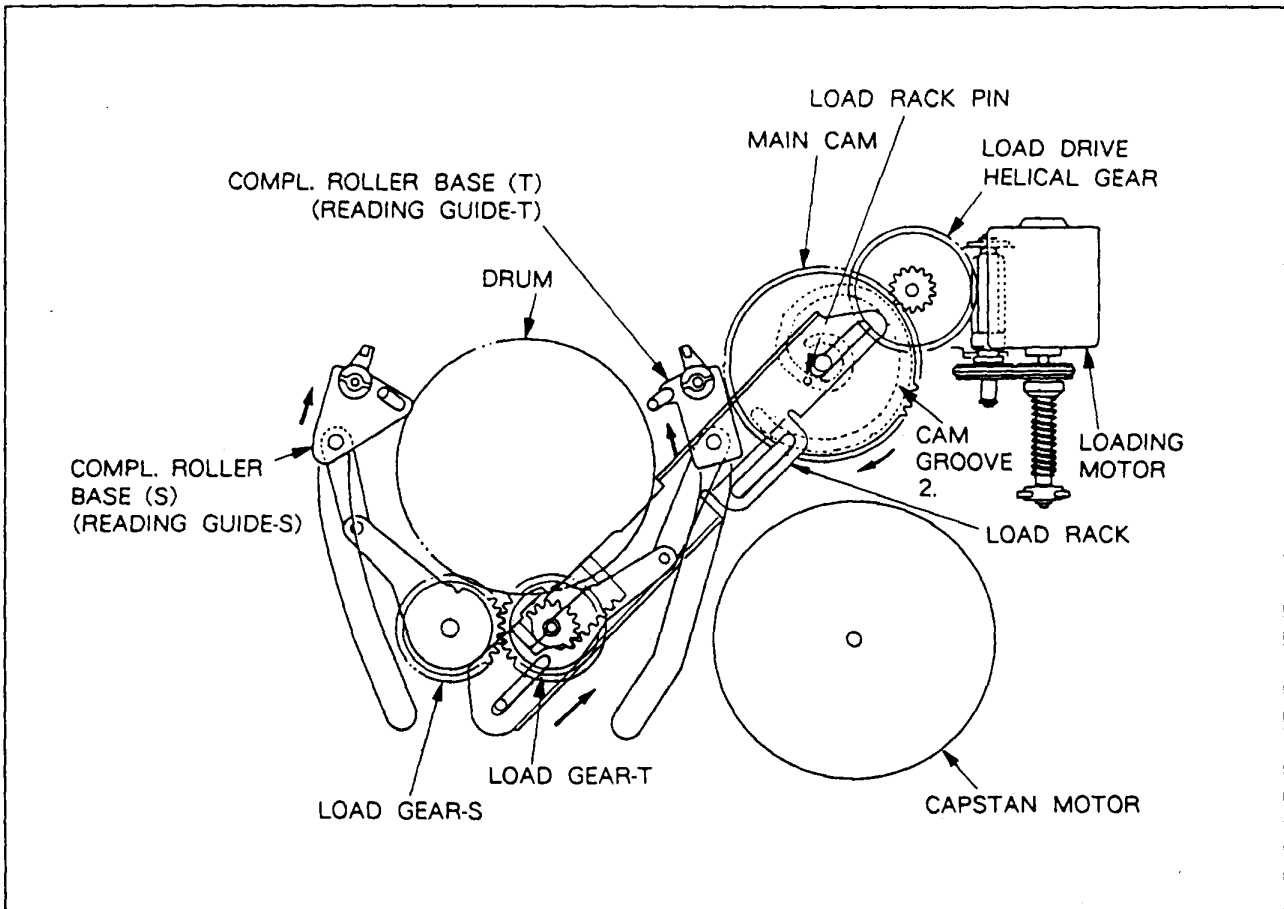


Fig. 2-5. Construction of Tape Loading Mechanism

### 2-2-2. Pinch Roller Pressing Mechanism

The PINCH LEVER assembly of the pinch roller is operated by the PINCH CAM LEVER (rod) driven by the CAM GROOVE 1 of the before-mentioned MAIN CAM, and then press-fitted to the capstan. The revolving tape guide (REV.GUIDE) is interlockingly operated with the PINCH LEVER assembly to ensure stable tape running at a fixed speed. (Fig. 2-6)

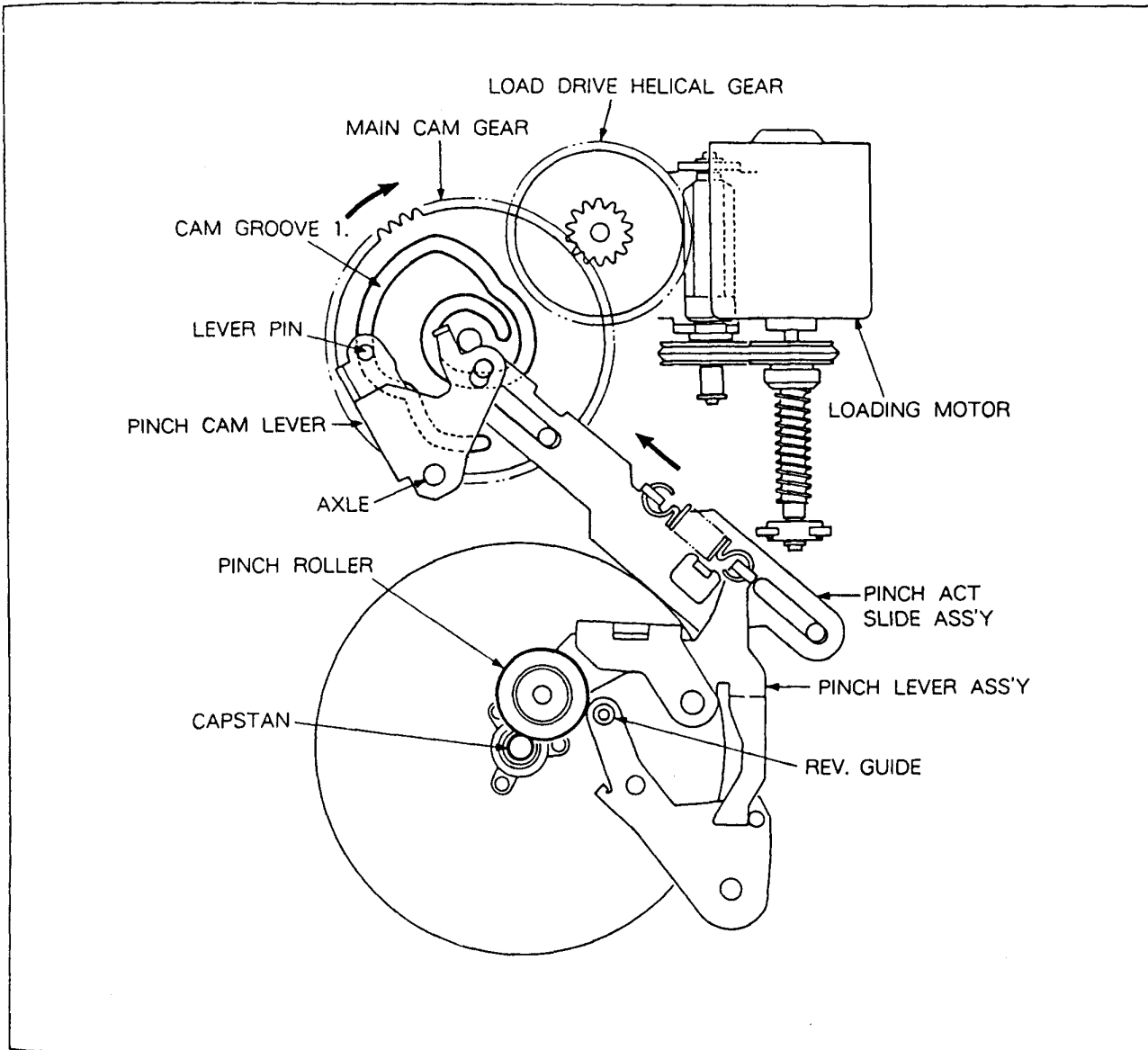


Fig. 2-6 CONSTRUCTION OF PINCH ROLLER MECHANISM



**2-2-3. Operation of Brake Control Plate**

The ACT SLIDE PLATE and the MAIN SLIDE PLATE shown in Fig. 2-7 is driven by the CAM GROOVE 4 of the MODE CAM GEAR for precise control of operations including the control of back tension lever, auxiliary brake (SUB BRAKE S/T), main brake (SUPPLY BRAKE and TAKE-UP BRAKE), clutch selection, and drive selection of front loading mechanism.

Also, the mechanism mode switch is engaged with the small gear of the MODE CAM GEAR for sync rotation. At the time, the detection position of each mode is set so that it becomes the flat section at the cam curve of the CAM GROOVE 4 of the MODE CAM GEAR. So, even if motor stop time deviation occurs due to the load following the detection of the loading motor stop position, the control plate linked with a stop in the specified position.

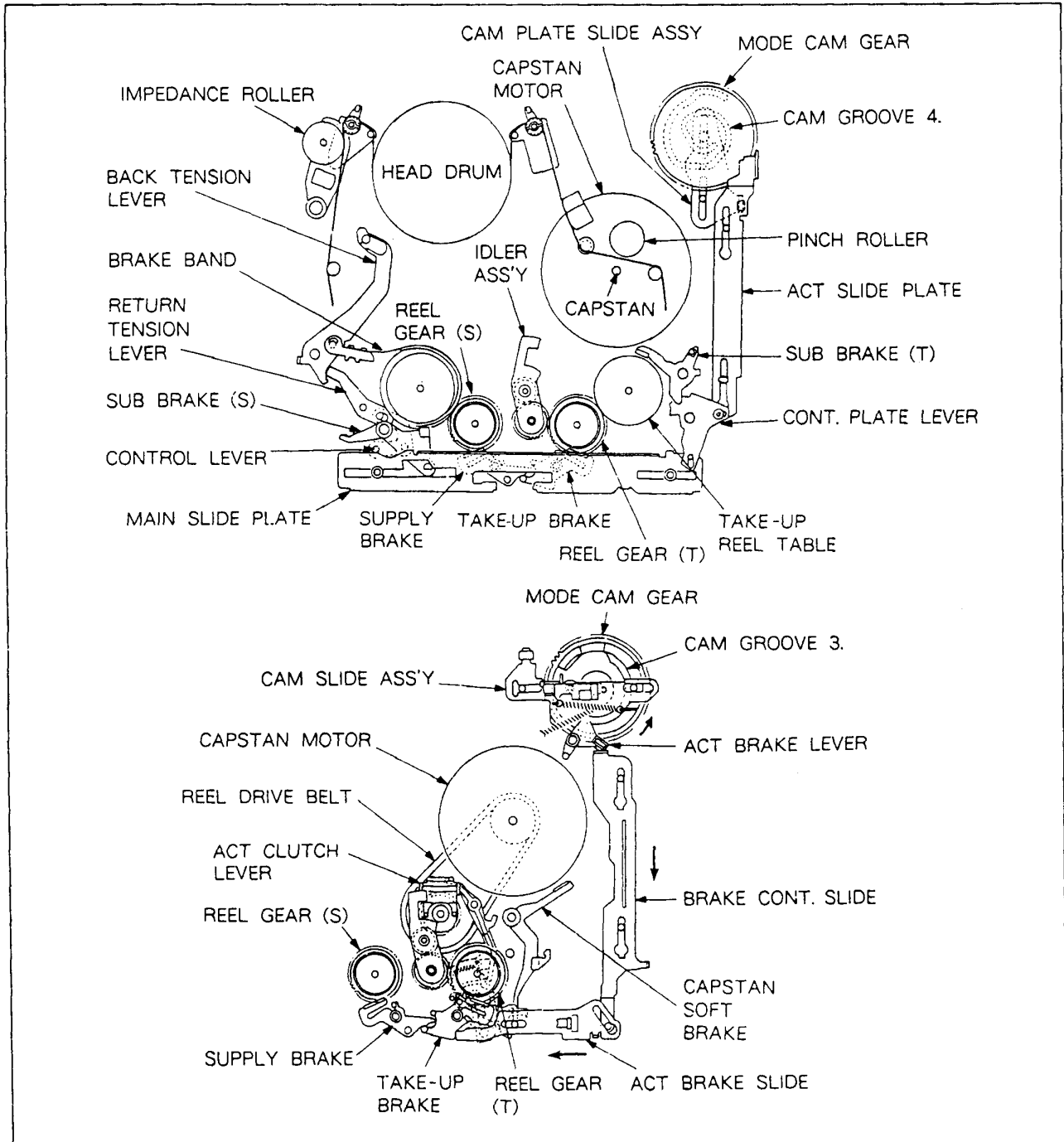


Fig. 2-7 CONSTRUCTION OF BRAKE CONTROL PLATE (AT REW/FF, STOP MODE)

**2-2-4. Brake Control Mechanism**

The mechanical logic of the brake state is shown in Fig. 2-8. The brake which damps the reel rotation is operated by the BRAKE CONTROL SLIDE driven from the CAM GROOVE 3 of the MODE CAM GEAR.

Also, to alleviate damage to the tape caused by high tension of the brake in operation, the tape is stopped after brake operation and the shape is thoughtfully designed for proper biting-in ratio of the left and the right brakes after-mentioned to each other.

This enables the supply brake to be released by the operation of the above-mentioned MAIN SLIDE PLATE after an elapse of prefixed slight time to reduce the tape tension to zero, and to provide the tape with a proper degree of looseness. As a result, a slight gap is created in the tape from the HEAD DRUM.

Further, a momentary still mechanism which dispenses with use of a plunger solenoid is not provided as one of design features of the P-90 mechanism.

To stabilize the image in an extremely short period of time during a shift to the STILL mode from the PLAY mode, the auxiliary brake (CAPSTAN SOFT BRAKE) is press-fit to the outer circumference of the capstan motor by the before-mentioned CAM GROOVE 3 of the MODE CAM GEAR.

These operations is interlocked with the operation of the before-mentioned ACT SLIDE PLATE and the MAIN SLIDE PLATE. It consists of one MODE CAM for offsetting the operating position.

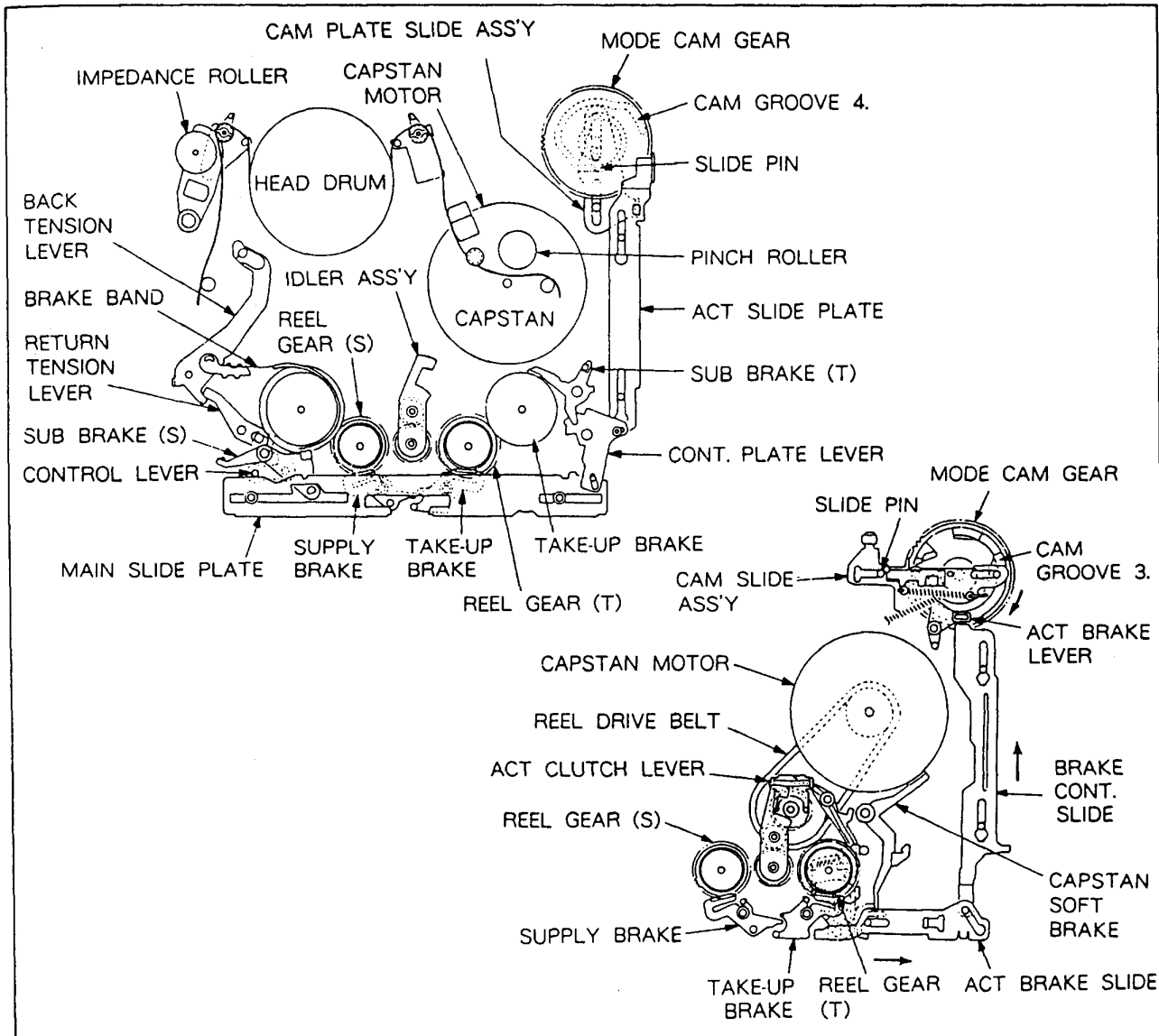
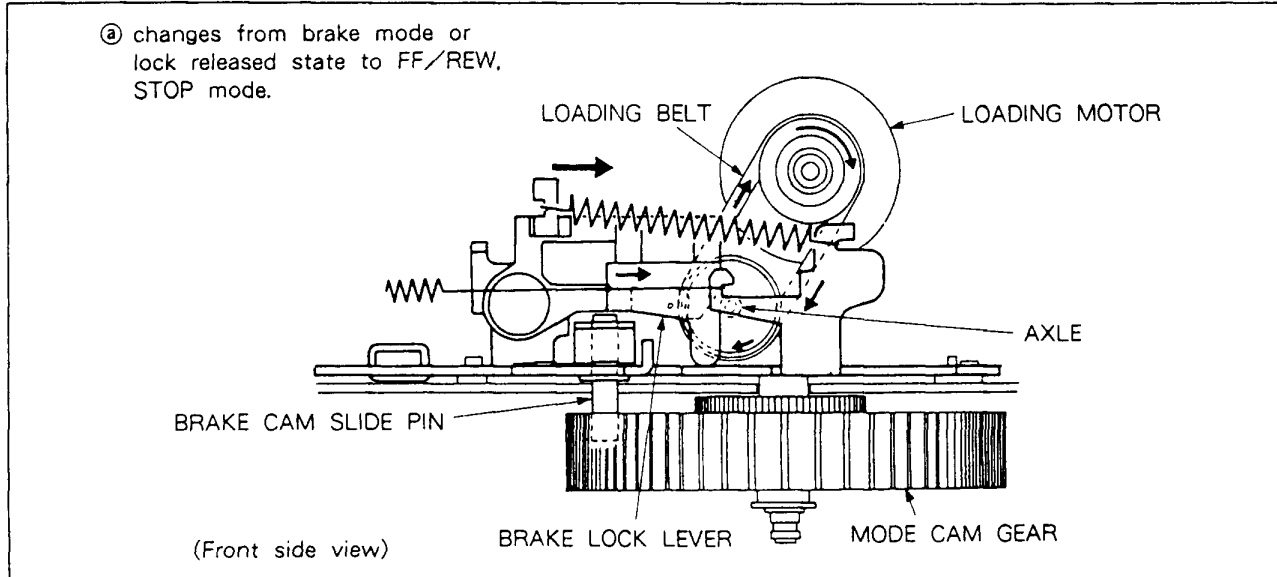


Fig. 2-8 CONSTRUCTION OF BRAKE CONTROL PLATE (AT BRAKE MODE)

**2-2-5. Brake Lock Release Mechanism  
(FF/REW → STOP Mode)**

The brake lock momentary release mechanism is shown in Fig. 2-9 (a), (b) and Fig. 2-10. In the FF/REW mode (Fig. 2-9 (a)) mechanical elastic

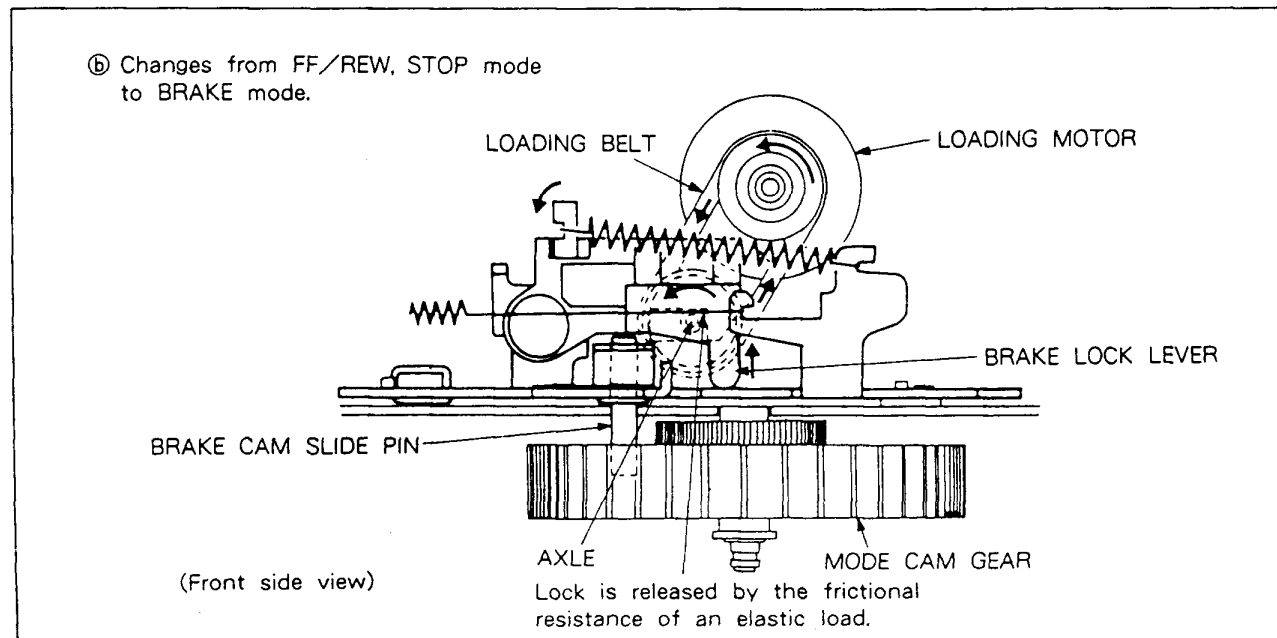
load is given to the BRAKE LOCK LEVER mounted on the BRAKE CAM SLIDE which causes the brake to operate, and it is locked to the high-speed rotary axle of the 1st reducing section of the loading motor.



**Fig. 2-9 (a) BRAKE LOCK & RELEASE MECHANISM**

At the time of a shift to the STOP mode from the FF/REW (Fig. 2-9 (b)), the BRAKE LOCK LEVER releases the lock on slight rotation of the axle by contact between the rotary shaft and the friction resistance so that the brake can be instantaneously

applied to the reel. The lock release speed is almost the same as the start-up of the loading motor. So, the its response to the brake is very quick, and construction is simplified also.



**Fig. 2-9 (b) BRAKE LOCK & RELEASE MECHANISM**

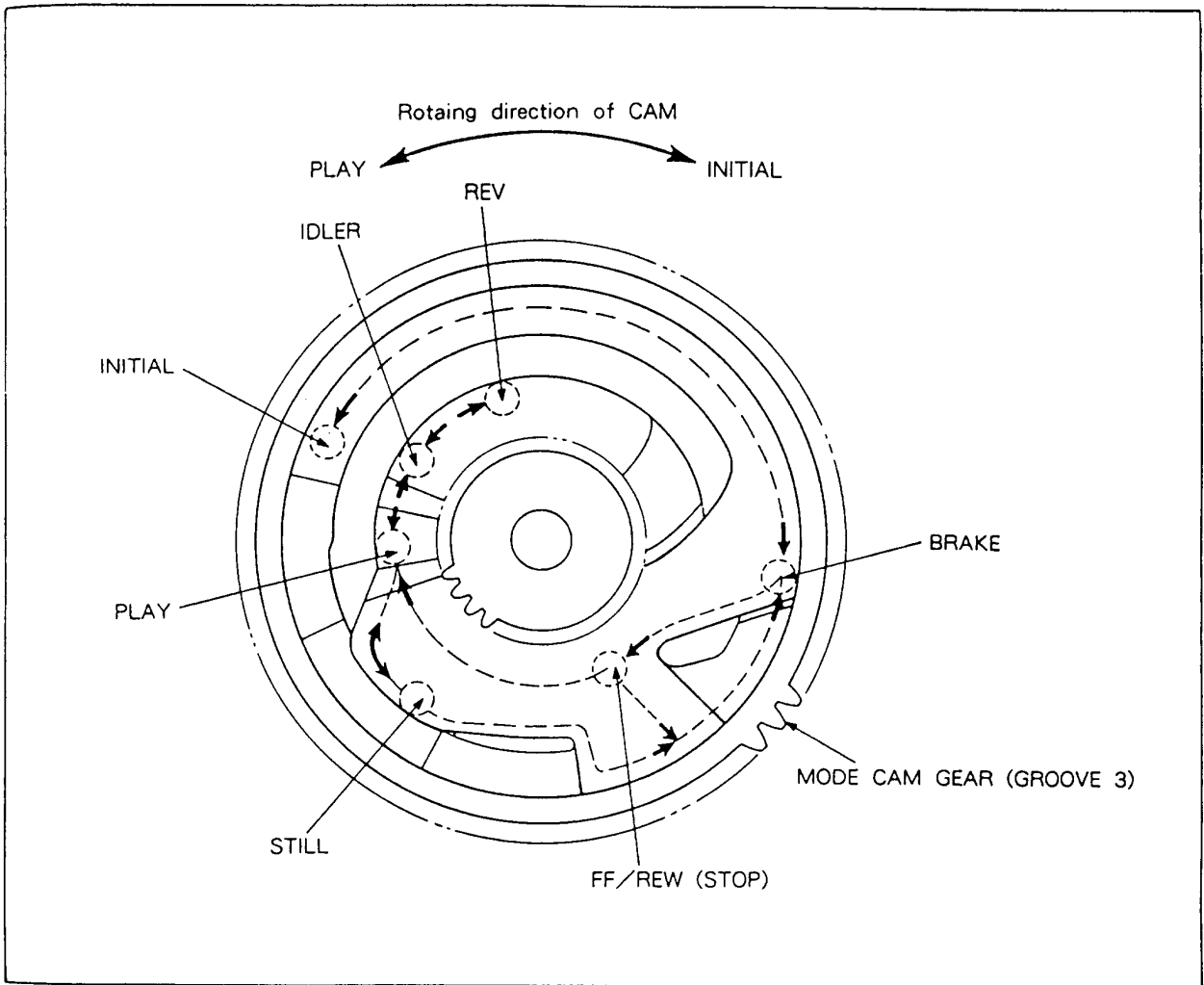


Fig. 2-10 POSITIONING OF BRAKE CAM SLIDE-PIN ON THE GROOVE 3 OF MODE CAM GEAR

## 2.3. REEL TABLE DRIVE

### 2-3-1. Reel Table Drive Mechanism

This mechanism employs the system of driving the tape from the DD capstan motor via rubber belt. In the tape constant speed running mode for PLAY, F-SEARCH, and R-SEARCH, the capstan and the pinch roller are press-fitted to allow the tape to run at a constant speed. By providing a FRICTION MECHANISM in between the capstan motor and the reel table, the tape is taken up. In the FF/REW tape high-speed take-up mode, the capstan and the pinch roller are separated from each other, and the

capstan motor and the reel table are linked direct by the clutch mechanism to carry out tape take-up. Also, to realize a thin type reel table drive section, the mechanism is simplified and the rotary parts are thinned for realization of physically compact design, and a step is provided on the reel table mounting section of the chassis by high-precision drawing process. A simplified figure of the drive mechanism is shown in Fig. 2-11 and Fig. 2-12. Power transmission to the pulley of the clutch mechanism section is done from the DD capstan motor via rubber belt.

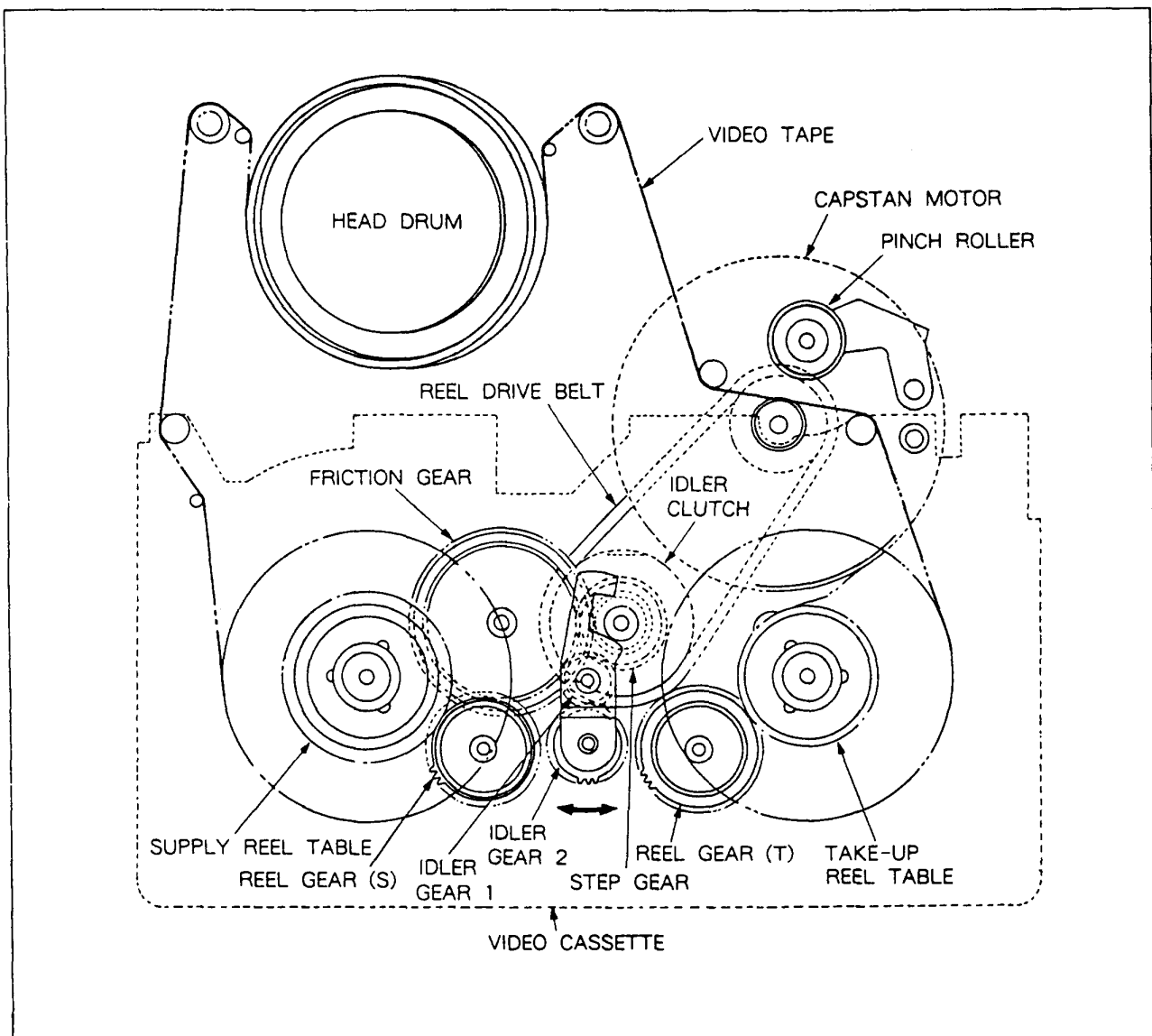


Fig. 2-11 REEL TABLE DRIVE

At that time, the reel table winding speed and the torque needed in a wide variety of modes are obtained by shifting the up and down STEP GEAR positioned at the upper section of pulley. The selection of the STEP GEAR is precision controlled by the MODE CAM GEAR via the BRAKE CONTROL SLIDE. With the up and down STEP GEAR down, the clutch mechanism is direct linked, and the transmission power from the capstan motor is sent to the reel table via IDLER GEAR assembly and REEL GEAR (S/T). On the other hand, FRICTION MECHANISM acts between the pulley and the STEP GEAR when the up and down STEP GEAR are in the elevated state, thereby controlling the transmission torque for generation of the take-up slip. Normally, it is desirable that the take-up torque of the reel table is higher in the R-SEARCH mode than that in the PLAY mode. This is because in the forward tape running the tape winding load to the HEAD DRUM has to be taken care of the capstan and the pinch roller.

While, in the reverse tape running mode the winding load has to be taken on the take-up reel table. In the special playback operation, a mechanism for varying the take-up torque of the reel table is required to be changed depending upon the running direction of the tape. But in this mechanism, the torque selection is made by varying the reduction speed ratio up to the reel table from the capstan motor on both the forward side and the reverse side of the tape. Also, design simplification of the selection mechanism is realized by using a single friction mechanism. In other words, the take-up torque necessary for forward/reverse rotation is obtained by controlling the capstan motor speed.

Rotation speed and torque needed for each mode of operation are converted by clutch mechanism for transmission of the drive power to the idler mechanism. The left and right moving IDLER GEAR assembly is automatically rotated to the left and the right according to the direction of capstan motor rotation by using the friction force. Because the mechanism is so designed as to drive the reel table of the side on which the tape is transported by the capstan and pinch roller, the forward and reverse constant speed drive (the PLAY, REC, F/R SEARCH modes) is carried out in the state in which the FRICTION MECHANISM is being operated (Fig. 2-12 (a)). On the other hand, in the condition in which the friction mechanism is not in operation, the forward/reverse high speed drive (FF/REW mode) is made possible (Fig. 2-12 (b)). Also, the reel drive in all modes is taken care of by the single left and right moving idler for design simplification.

The idler body employs gear drive to improve reliability with a view to realizing parts thinning while securing the transmission reliability. Using a resin molded gear as material of an idler, the efficiency of the entire reel drive system has been improved because there are no deformation and loss, and minimized rotation moving torque necessary for biting-in as in the case of a material such as rubber which shows considerable elastic deformation, etc. Further in this mechanism, an intermediate gear is provided in between the reel side and the idler to minimize the rotating and moving angle of the left and right moving idlers, thereby holding the reversing time to a minimum when shifting to the tape running direction change mode. This results in significantly reduced possibility of tape looseness.

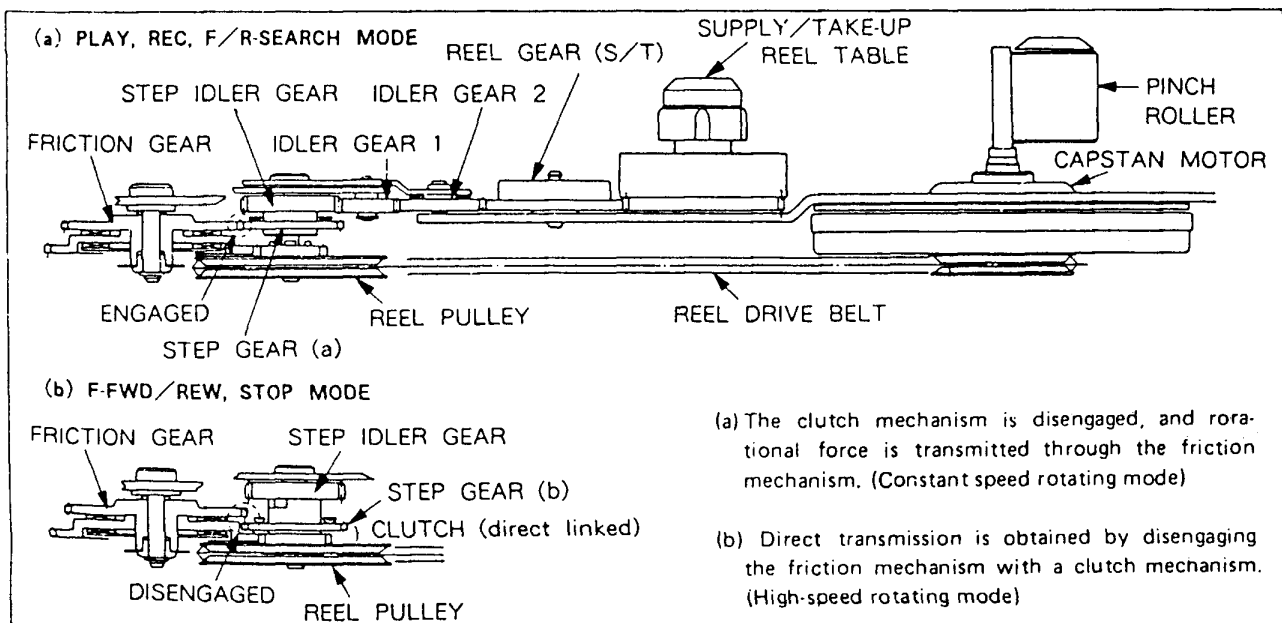


Fig. 2-12 REEL TABLE DRIVE (SIDE VIEW)

**2-3-2. Reel Table Drive Clutch Lock and Release Mechanism**

As described in the preceding section, using the selection of the step gear (CLUTCH MECHANISM), two mechanisms which are driven by being selected via direct drive or via FRICTION MECHANISM from the capstan motor, to execute the reel table drive. The operating status of the clutch lock and the releasing mechanism is shown in Fig. 2-13.

Fig. 2-13 ① shows the tape unloading position (INITIAL position) when the power for the mechanism operating mode is switched off.

At that times all the levers are in the initial positions, and the clutch is released also so that a route for reel table drive is created via a friction mechanism.

Fig. 2-13 ② shows that the mechanism operation mode has executed the tape loading and that it has completed its movement to the STOP (stand-by), FF/REW position.

At this time, the CLUTCH ACT LEVER is operated by the hook of the ACT BRAKE SLIDE to move the ACT CLUTCH LEVER in the direction of arrow via the CLUTCH LEVER and the CLUTCH CHANGE LEVER. Now, the up and down STEP GEAR is placed into the direct coupled state. In the FF/REW mode, the reel table is directly driven so that the rotation of the capstan motor is directly transmitted to make high-speed rotation drive possible. When shifting the mode to the STOP from the FF/REW in this condition, the mechanism mode position is once moved back to the brake position, and when the reel table brake is instantaneously applied, the clutch is released once at the same time, after which it returns to the same mechanism mode as the FF/REW mode once again. Now, it is placed in a waiting state in the same condition of the STOP mode as shown in Fig. 2-13 ②.

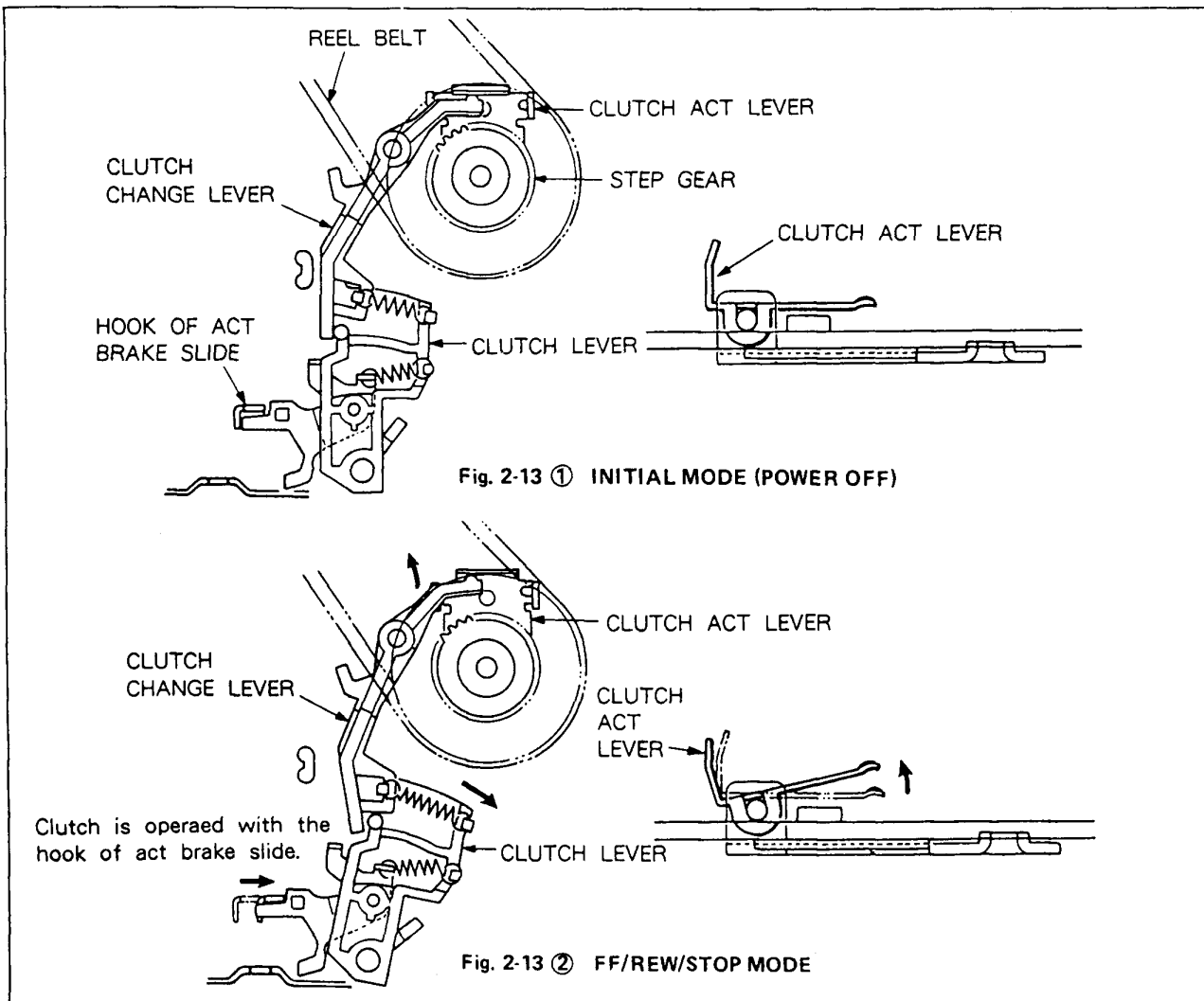
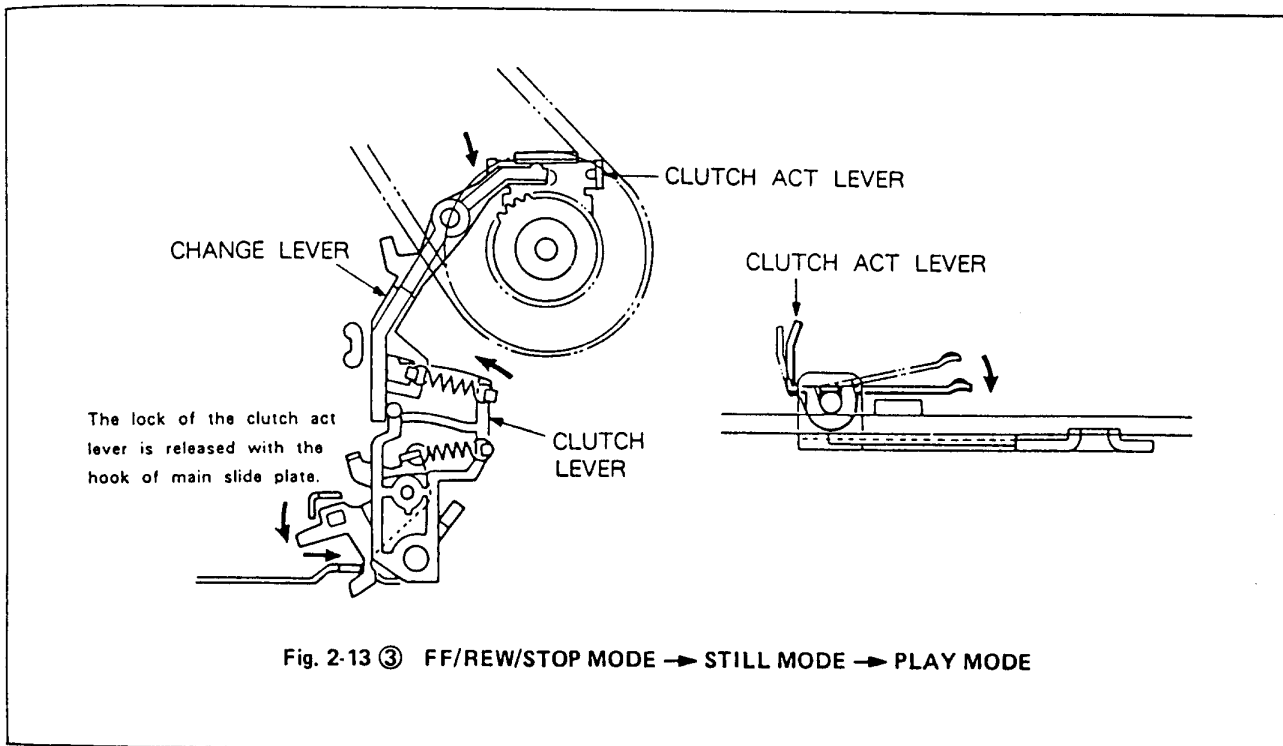


Fig. 2-13 ① - ③ REEL TABLE DRIVE CLUTCH LOCK AND RELEASE MECHANISM



Fig. 2-13 ③ shows the completion state of a shift to the PLAY mode via the STILL mode from the STOP (FF/REW) mode for the mechanism mode position.

In the case of this mode shifting, the movement of the BRAKE ACT SLIDE remains fixed. So, the CLUTCH ACT LEVER should be unlocked by the movement of the hook of the MAIN SLIDE PLATE to cause the clutch to be released. This movement in turn causes the capstan motor rotation to be transmitted via the friction mechanism. So, the constant speed rotation drive necessary for the PLAY (REC) mode and SEARCH mode is made possible.





## 2.4. FRONT LOADING DRIVE SELECTION MECHANISM

In the P-90 mechanism, the motor dedicated to the use of front loading is not employed. The drive source is utilized instead of the tape loading motor. As shown in Fig. 2-14 (a)/(b), during the front loading the FRONT LOAD WORM GEAR directly coupled to the tape loading motor axle and the FRONT HELICAL GEAR with several teeth missing are engaged with each other and rotated for transmission of the drive force to the front loading mechanism. When the cassette tape is inserted completely in the mechanism, the FRONT HELICAL GEAR is automatically disengaged from the FRONT LOAD WORM GEAR. After that, the tape loading operation is performed without the tape loading motor drive force being transmitted to the front loading mechanism.

While the drive force is being transmitted to the front loading mechanism, the CAM GROOVES of the before-mentioned MAIN CAM GEAR and the MODE CAM GEAR are flat in cam line pattern. These are therefore held without changing the mode state of the mechanism in any way.

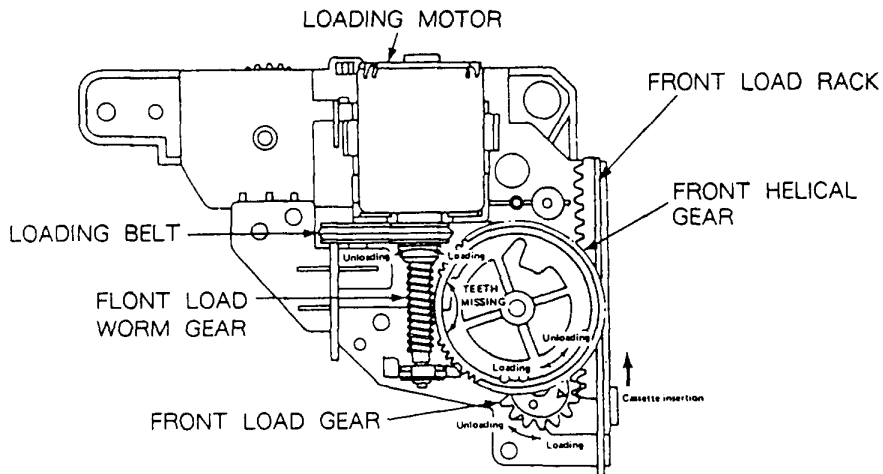


Fig. 2-14 (a) FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE INSERTED POSITION)

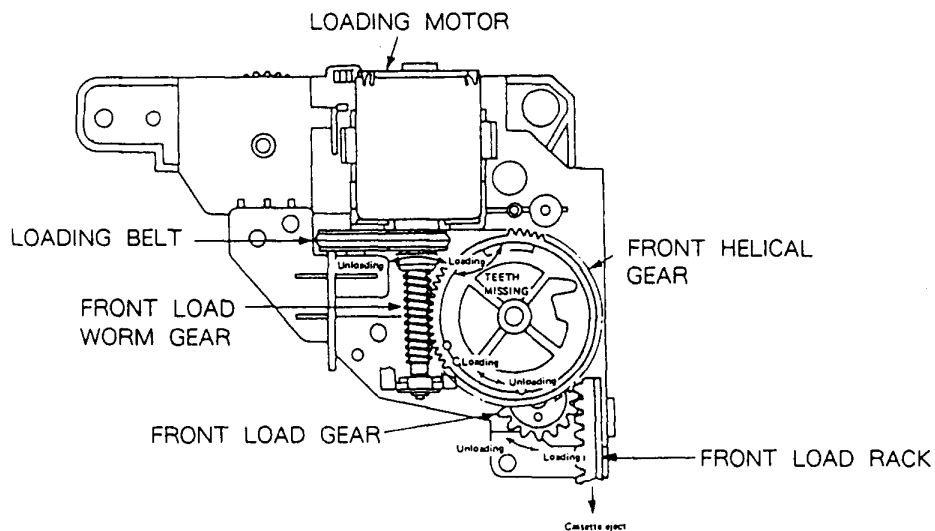
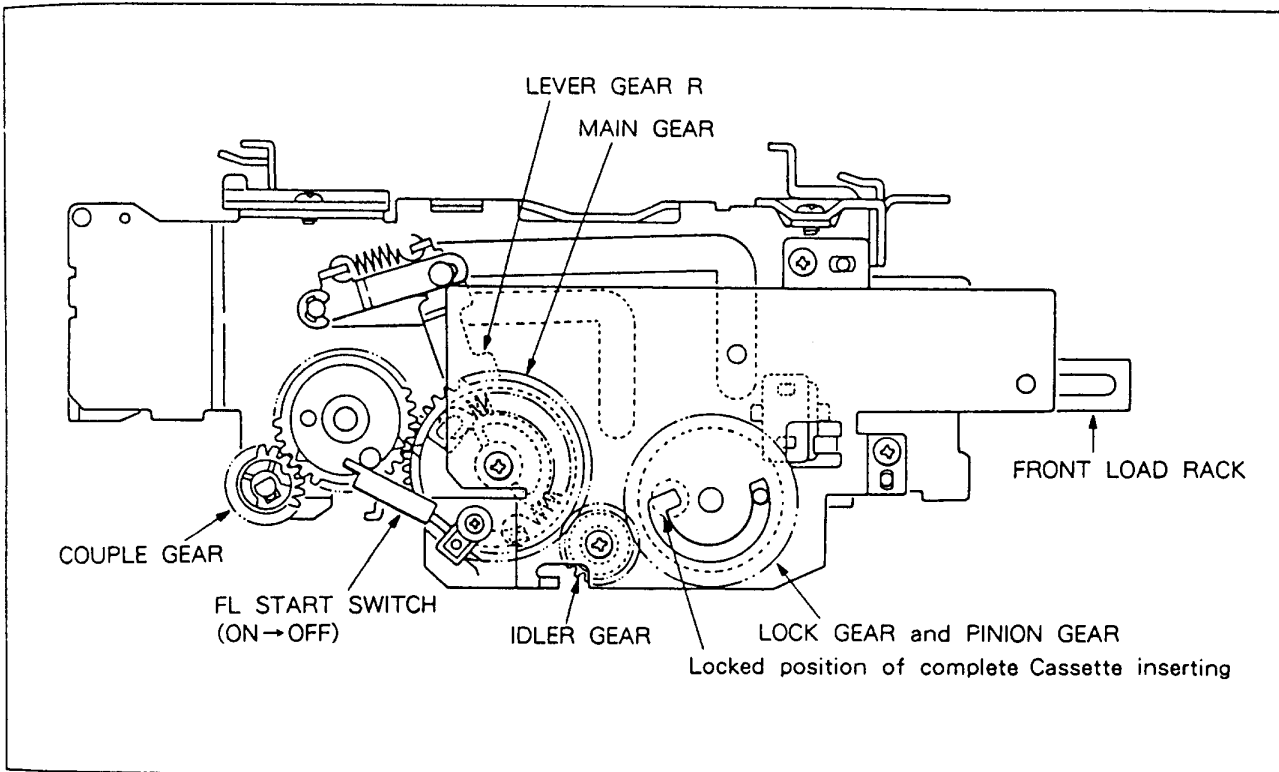


Fig. 2-14 (b) FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE EJECTED POSITION)

**(A) Cassette inserting operation**

When inserting a cassette from the cassette ejected state of Fig. 2-14 ⑥, the FL START SWITCH shown in Fig. 2-15 is turned OFF, to cause the loading motor to be rotated in the direction of inserting. As a result, the FRONT LOAD RACK is drawn in, and the front loading is made up to the cassette tape completion point. So, it is locked in the grooves shown in Fig. 2-15 to complete cassette inserting. At that time, the FRONT HELICAL GEAR is positioned at ③ of Fig. 2-14, and is released from the front loading mechanism, therefore, the tape loading operation is continuously performed.



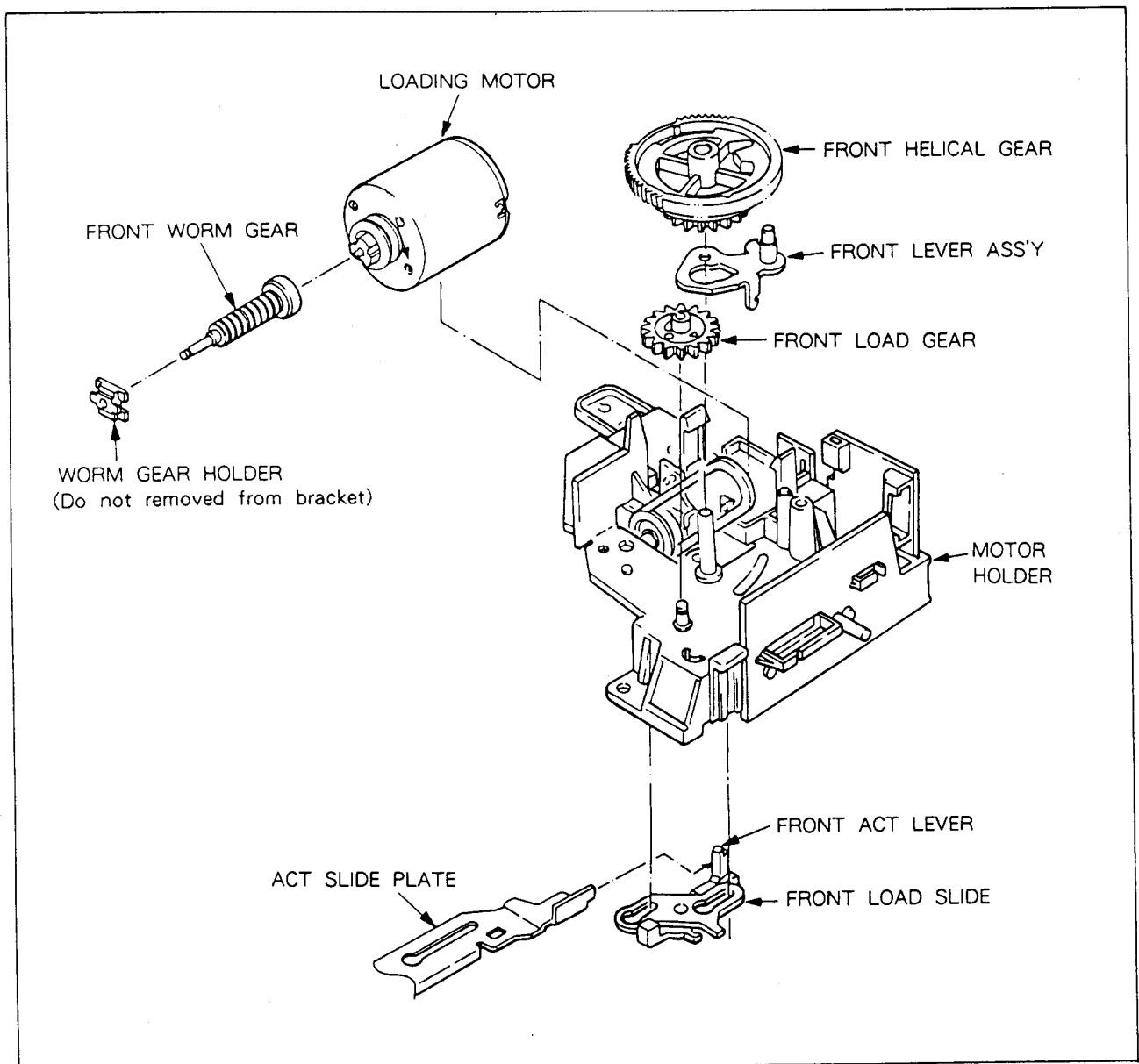
**Fig. 2-15 CASSETTE HOLDER MECHANISM (CASSETTE INSERTING OPERATION)**

**(B) Cassette ejection operation**

The components of the front loading mechanism is shown in Fig. 2-16.

When ejecting the cassette from the inserted state shown in Fig. 2-14 ②, the FRONT ACT LEVER is pushed in the direction of arrow due to the ACT SLIDE PLATE moves in the direction of arrow shown in Fig. 2-17. As a result, the FRONT LEVER assembly is turned counterclockwise via the FRONT LOAD SLIDE to cause the FRONT HELICAL GEAR to be engaged with the FRONT LOAD WORM GEAR of the loading motor. At that time, the loading motor is being rotated counterclockwise, so that the FRONT HELICAL GEAR is caused to be rotated

counterclockwise also to carry out the front unloading via the FRONT LOAD GEAR and the FRONT LOAD RACK. At the same time, the FRONT ACT LEVER is operated counterclockwise by the hook of the FRONT HELICAL GEAR. This releases the lock being pushed in the direction of arrow indicated by the ACT SLIDE PLATE. So, the FRONT LOAD SLIDE assembly now moves to the initial position to prepare for the next ejection operation. Incidentally, the movement of the FRONT LEVER assembly performs an important function of positioning the FRONT HELICAL GEAR (Fig. 2-14 ②) upon completion of cassette mounting, in addition to the cassette eject start-up operation.



**Fig. 2-16 FRONT LOADING DRIVE SELECTION MECHANISM**

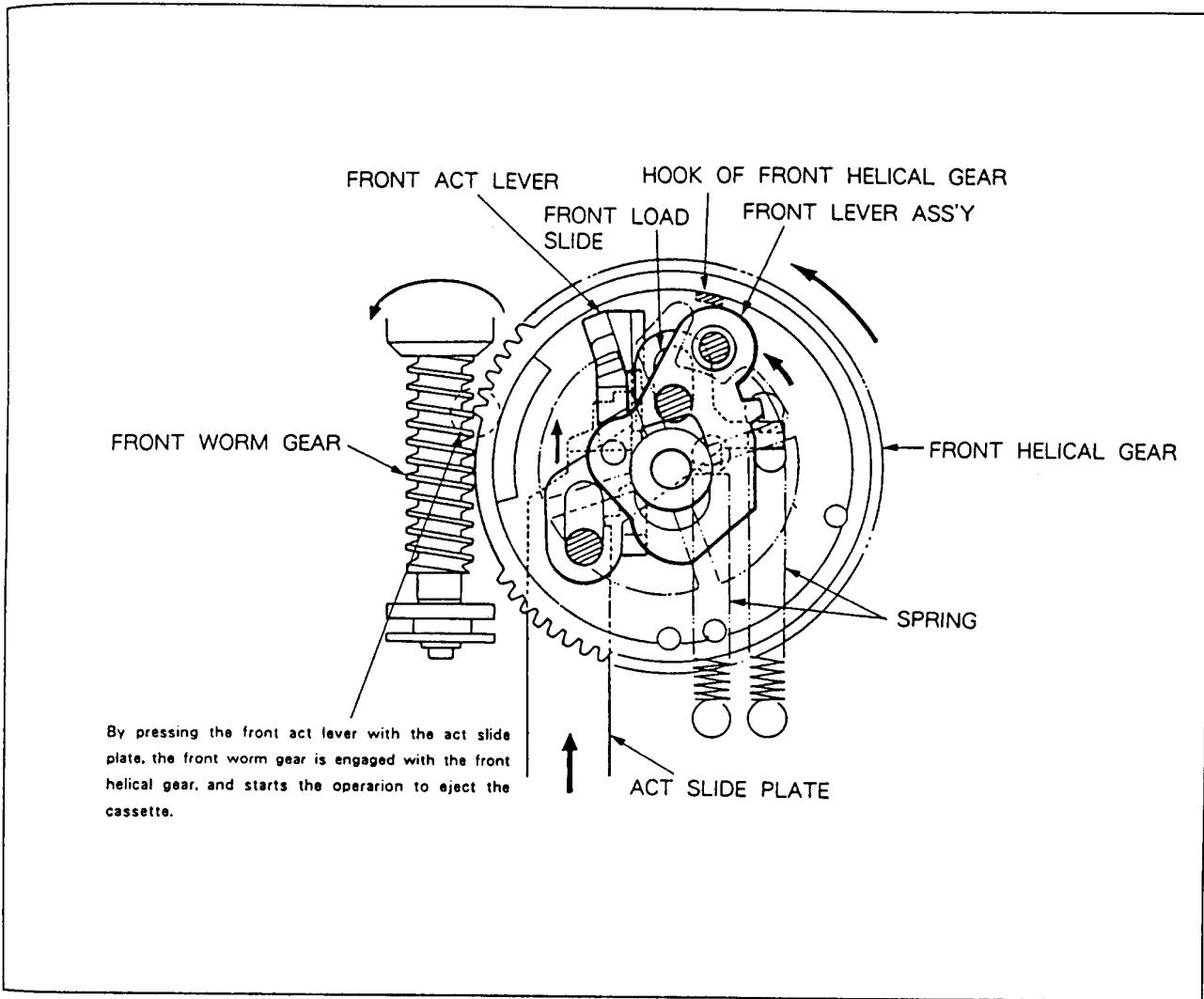


Fig. 2-17 CASSETTE EJECTION START OPERATION (See through top view)

## 2.5. CASSETTE HOLDER MECHANISM

### 2-5-1. Components

The exploded view of the cassette holder mechanism is shown in Fig. 2-18. This mechanism consists of a cassette tray for feeding the cassette tape to the specified position of the mechanism chassis, a side plate provided with L type holes for supporting and guiding it, the top plate for regulating the width of left and right, and a group of gears for driving the cassette tray.

The entire mechanism is of independent construction apart from the mechanism body. The holder is fixed on the mechanism chassis by inserting the pawls at two points and tightening the setscrews at two points, or at a total of four points.

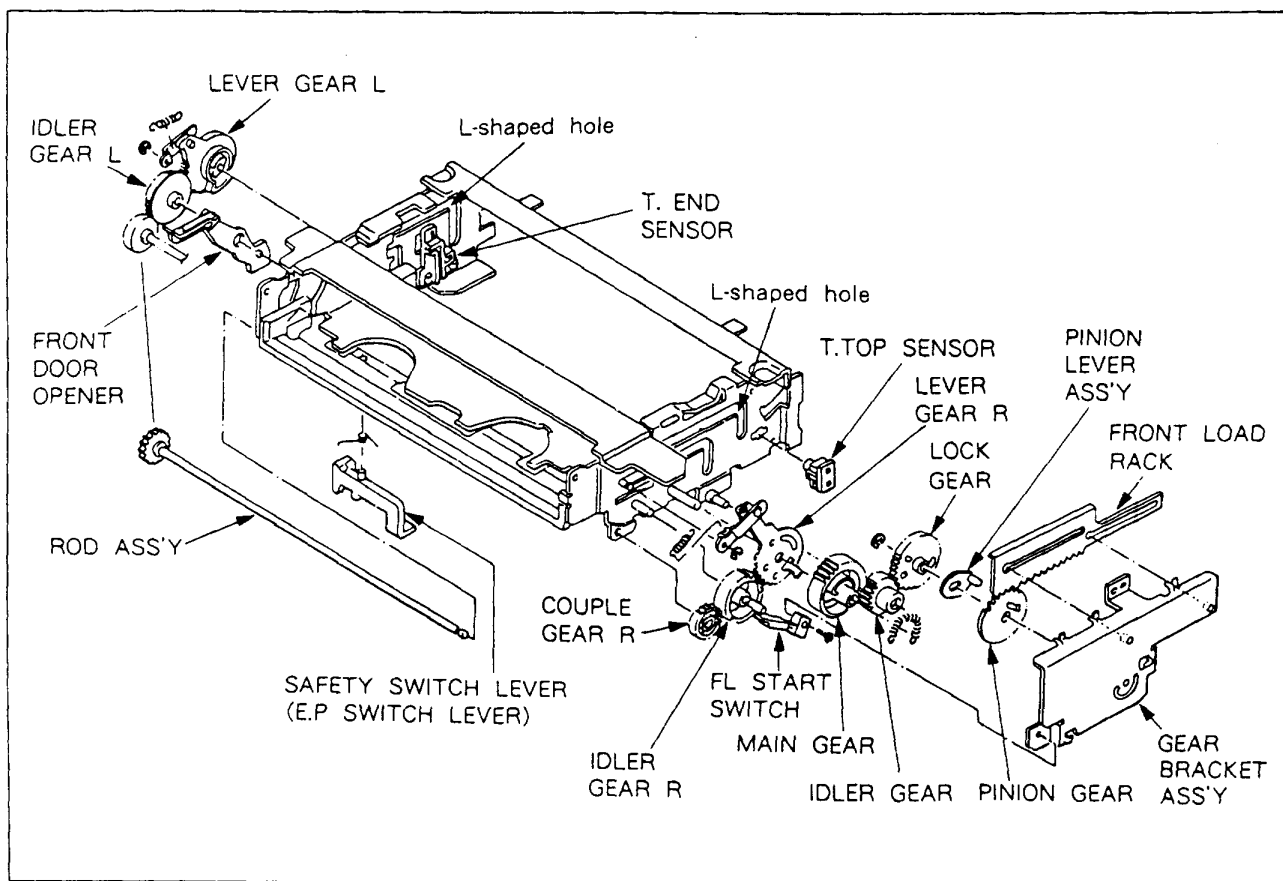


Fig. 2-18 EXPLODED VIEW OF THE CASSETTE HOLDER MECHANISM

### 2-5-2. Description of Cassette Holder

The cassette holder is of motor-less design, as the lowering of mechanism height and driving source are done by the loading motor of the mechanism body.

As a substitute for the worm gear system hitherto used in the major drive section for the drive selection mechanism mentioned in section 2-4., the RACK LOADING system is adopted in this cassette holder mechanism. By this mechanism the motor-less design can be realized. An exploded view of the mechanism is shown in Fig. 2-19. A description of the operation is made below along with Fig. 2-19. To press-fit the cassette tape after sending it onto the mechanism chassis, the PINION GEAR section is triple construction. The FRONT LOAD RACK side and the IDLER GEAR side are independently

engaged. The PINION GEAR and the LOCK GEAR are connected from the PINION LEVER PIN riveted to the PINION LEVER. Even after feeding the cassette tape to the specified position of the mechanism chassis, the FRONT LOAD RACK slides, giving the rotation to the PINION GEAR which is engaged with the FRONT LOAD RACK. At that time, a pin is dropped into the groove section provided on the GEAR BRACKET ASS'Y.

The other LOCK GEAR is fixed by this PINION LEVER PIN, and the cassette tape is press-fitted onto the mechanism chassis by linked IDLER GEAR. The before-mentioned FRONT LOAD RACK and the PINION GEAR are set free after dropping the PINION LEVER PIN into the groove section. So, the drive force of the loading motor is sent to the mechanism body.

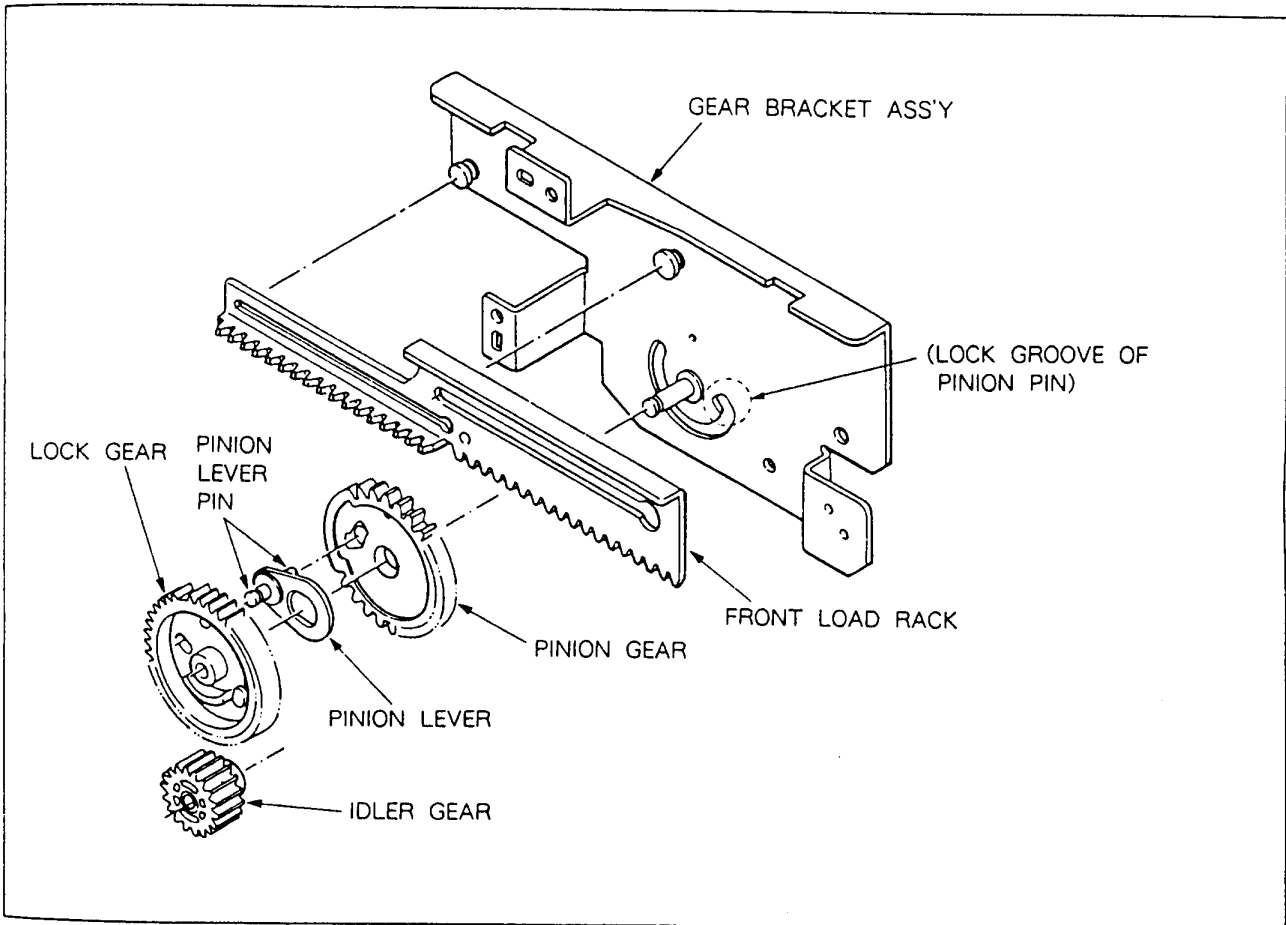


Fig. 2-19 RACK LOADING MECHANISM OF CASSETTE HOLDER

### 3. MECHANISM CONTROL

#### 3-1. MODE ARRANGEMENT

This mechanism is arranged in such a mode layout as shown in Table 3-1 and as described in section 2-1. The mode sensing switch described below is used for control of these modes.

#### 3-2. MODE DETECTION SWITCH

For mode detecting one leaf switch (FL START SWITCH) and one rotary switch (MECHANISM MODE SWITCH) are used in combination.

Mechanism Mode	Mechanism Mode Switch			HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode	
	3	2	1					
EJECT	-	-	-		Eject position	Detected by FL start switch ← Cassette insertion through STOP or PLAY mode STOP from EJECT → ← Pre-rolling after detecting tape end with tape end sensor.	EJECT	
				↑ Front loading/Unloading ↓			Low side of ⑧ Sensed upon IN	
SHORT REW	1	1	0	Take up operation in the tape end position				
INITIAL	1	1	1	⑦	Power off position	Power ON ↔ OFF when the cassette is inserted completely. From PLAY FF/REW to STOP From FF/REW to STOP	Power off when tape is loaded completely	
				Tape unloading position ↓ Tape loading ↓ Tape loading ending position				
BRAKE	0	0	1	①	Main brake applying position	ON OFF		
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)			STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.	From SLOW to STOP (or STILL) From FF to F-SEARCH From F-SEARCH to FF	STILL, SLOW, F-ADV	
PLAY	1	0	0	④	From FWD direction Normal running mode	From PLAY ↔ STILL From F-SEARCH to FF From F-SEARCH to REW	PLAY, REC, F-SEARCH	
						From REW to R-SEARCH From R-SEARCH to REW		
IDLER	1	0	1	⑤	Forward/reverse changeover position		PAUSE	
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH	

Table 3-1

(1) Switch component

The mode switch consists of FL START SWITCH for detecting the cassette ejection and insertion, and MECHANISM MODE SWITCH for detecting the each mode position of the mechanism. As can be understood from Fig. 3-1, the MECHANISM MODE SWITCH rotates in excess of 360 degrees. Therefore, the sensing of a signal from the MECHANISM MODE SWITCH is done by the leaf switch.

In the P88 and P89 mechanisms, incidentally, short REW position is detected by the FL END SW, but in the P90 mechanism, the FL END SWITCH is not required due to a change in the internal structure of the MECHANISM MODE SWITCH.

(2) Mechanism mode switch

The mechanism mode switch consists of four terminals, namely, COM, DATA1, DATA2, and DATA3. These are processed as 3-bit signals for discrimination of seven modes.

The MECHANISM MODE SWITCH is not interchangeable with the hither to available black switch due to a change in its internal structure. Be sure therefore to use a blue switch.

### 3.3. CONSIDERATION TO FULL LOADING

- ① In the normal stop condition, the head drum is rotated to facilitate the start-up of the image at the time of playback, but it is conceivable that this is left undisturbed for an extended period of time. This may result in wear of the video head. For this reason, when five minutes elapse from the stop condition, the head drum stops rotating.
- ② To prevent the tape from being caught in the head drum due to dew forming, etc., the tape is housed in the unloaded cassette when turning the power off.

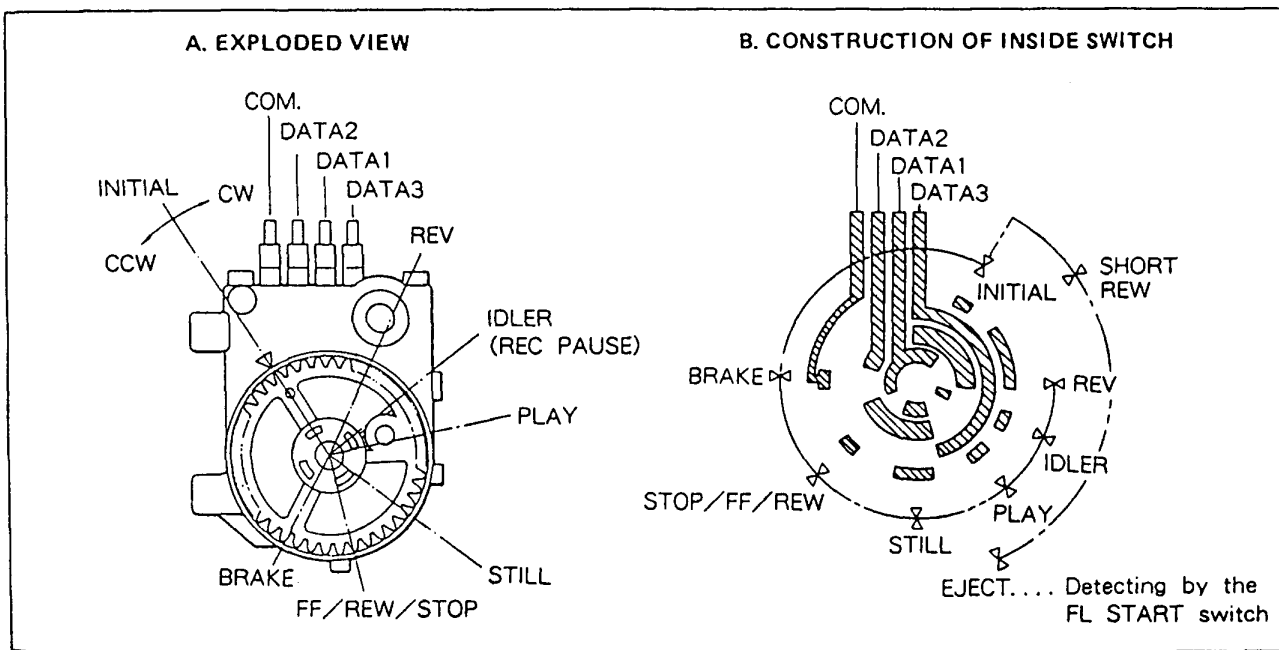


Fig. 3-1 MECHANISM MODE SWITCH (ROTARY SWITCH)



## 4. MECHANISM MAINTENANCE AND CHECKING

### 4-1. PERIODIC CHECKING AND MAINTENANCE ITEMS AND SERVICE JIGS

The following maintenance and periodic checking procedures are recommended to ensure proper operation, and to protect the tape from dirt and damage. Also, these procedures should always be followed after repairing the unit.

#### 4-1-1. Periodic Check Items

○ Cleaning    ⊙ Confirmation    △ Lubrication

Part		Usage Time (hours)										Remarks
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape Guide System	Tape running surfaces	○	○	○	○	○	○	○	○	○	○	
	ACE head	○	○	○	○	○	○	○	○	○	○	
	Drum (cylinder)	○	○	○	○	○	○	○	○	○	○	Head life depends heavily on operating conditions.
Drive System	Loading belt	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
	Reel drive belt	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
	Intermediate gear, pulley axles		△		△		△		△		△	Absolutely avoid oil on tape running surfaces.
	Capstan axles		△		△		△		△		△	
	Loading motor		⊙		⊙		⊙		⊙		⊙	
Performance Check	Back tension torque		⊙		⊙		⊙		⊙		⊙	50 ± 10gcm.
	Brake system		⊙		⊙		⊙		⊙		⊙	
	FF, REV, PLAY torque		⊙		⊙		⊙		⊙		⊙	FF : 600 gcm and over REW : 750 gcm and over REV : 150 to 240 gcm PLAY : 80 to 140 gcm

**Note:** The back tension torque is the value that has been measured by the cassette torque meter (Back tension, REW: VHT-063S) (REV: VHT-404S).

The torque of FF, REV, REW, and PLAY represent those measured with them locked by the torque gauge.

FF and REW are values 2 seconds after starting.

Torque Tape: VHT-063S (J-6082-066-A)

VHT-404S (J-6082-067-A)

#### 4-1-2. Cleaning

① Drum (COMPL CYLINDER) and Video Heads (See Fig. 4-1-1.)

- 1) Wrap a chamois leather around your finger and moisten it with methyl alcohol.
- 2) Move the chamois leather to left and right several times on the video head to clean. There is a video head also on the opposite side, so clean it likewise. In Hi-Fi models, clean the audio head also.
- 3) Clean the tape path surface of the cylinder in the same way.

**Note:** Always turn power off before cleaning. Do never move the chamois leather vertically or apply too much force to the head; it may be damaged.

② Cleaning of the Tape Guide System (See Fig. 4-1-2.)

- 1) Set the EJECT mode and clean the tape guide system (tape guides, impedance roller, FTE head, ACE head, pinch rollers, capstan axles, etc.) with a chamois leather moistened with methyl alcohol.

**Note:** Make sure that no oil, grease, etc. adhere to the chamois leather and that heads are not damaged.

③ Cleaning of the Drive System

- 1) Clean the drive system (loading belt, reel drive belt, pulley, supply reel table, etc.) with a soft cloth moistened with methyl alcohol.

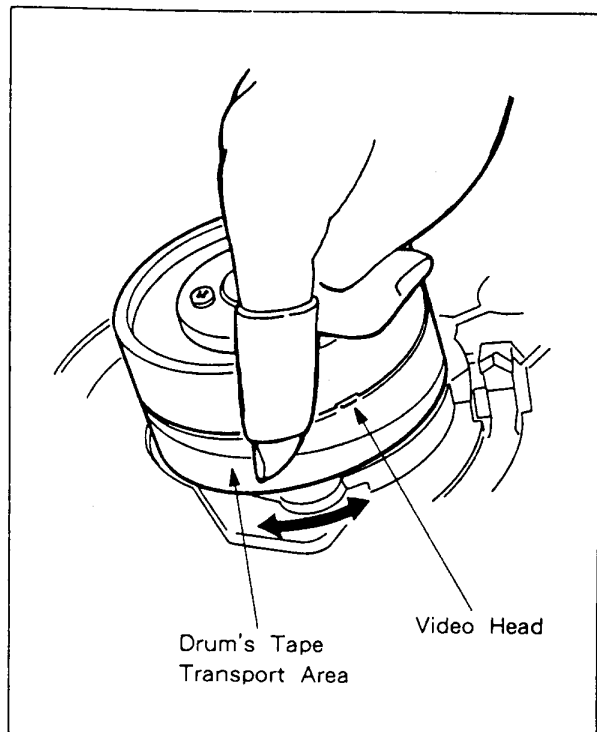


Fig. 4-1-1.

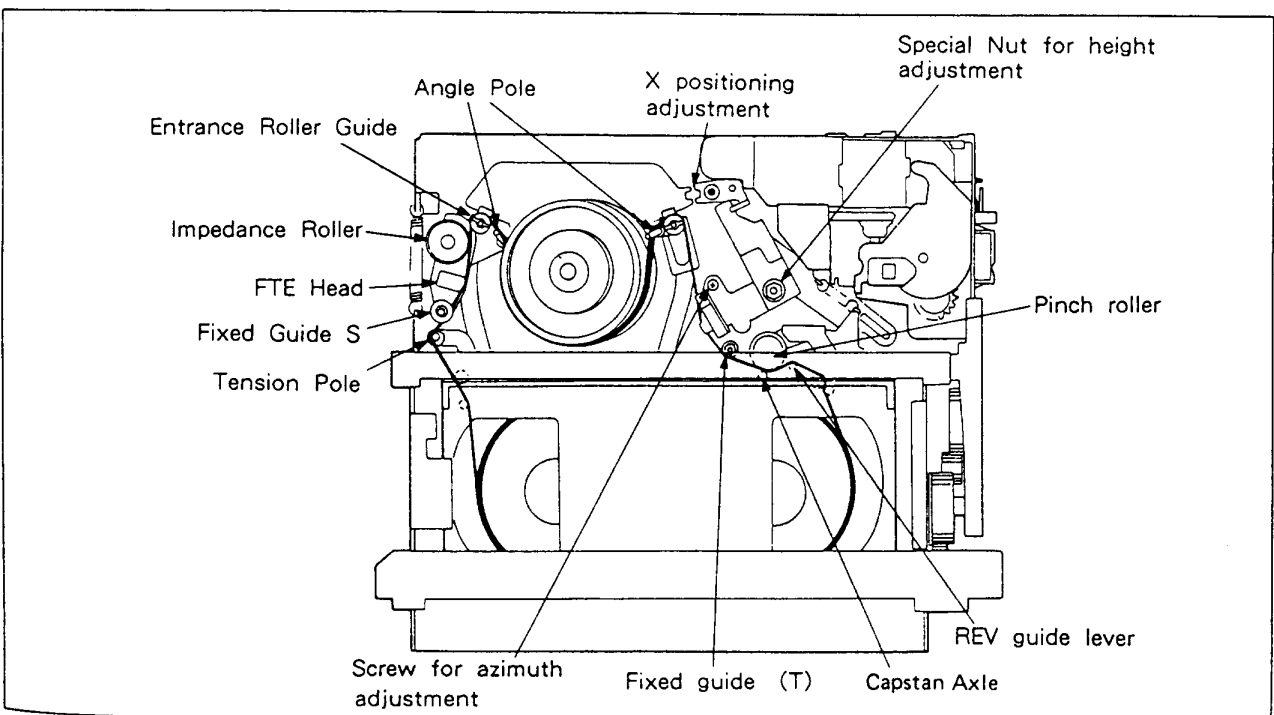


Fig. 4-1-2. Cleaning

### 4-1-3. Service Jigs

No.	Jig	Jig No.	Remarks
1	Alignment tape (PAL)	H-7099-052-H	PAL-NORMAL
2	Eccentric screwdriver (VHJ-0003)	J-6082-044-A	For tape path adjustment
3	Nut box (VHJ-0048)	J-6082-045-A	For tape path adjustment
4	Torque gauge	H-7099-039-H	For reel take-up torque measurement
5	Torque gauge adapter	H-7099-035-H	For reel take-up torque measurement
6	REV guide lever removing tool (VHJ-0073)	J-6090-007-A	For REV guide lever removal
7	Torque gauge screwdriver (VHJ-0014)	J-6082-047-A	For screw fastening torque adjustment
8	3mm dia. bit for torque screwdriver (VHJ-0045)	J-6082-048-A	Spare bit for the torque gauge screwdriver
9	Video head removing tool (VHJ-0041)	J-6082-049-A	For upper drum removal
10	Mode selector (VHJ-0050)	J-6082-050-A	For mechanism mode selection
11	Master plane	H-7099-279-H	Reel table height
12	Reel disc height jig	H-7099-038-H	Reel table height
13	Mode selector relay board (VHJ-0103)	J-6090-049-A	Relay board for mode selector (22pin)
14	PAL torque cassette (VHT-063S) (PAL)	J-6082-066-A	For back tension torque
15	26-pin flexible flat cable (VHJ-0064)	J-6090-006-A	Spare cable for mode selector

<p>H-7099-052-H</p> <p>No. 1</p>	<p>J-6082-044-A (VHJ-0003)</p> <p>No. 2</p>	<p>J-6082-045-A (VHJ-0048)</p> <p>No. 3</p>	<p>H-7099-039-H</p> <p>No. 4</p>
<p>H-7099-035-H</p> <p>No. 5</p>	<p>J-6090-007-A (VHJ-0073)</p> <p>No. 6</p>	<p>J-6082-047-A (VHJ-0014)</p> <p>No. 7</p>	<p>J-6082-048-A (VHJ-0045)</p> <p>No. 8</p>
<p>J-6082-049-A (VHJ-0041)</p> <p>No. 9</p>	<p>J-6082-050-A (VHJ-0050)</p> <p>No. 10</p>	<p>H-7099-279-H</p> <p>No. 11</p>	<p>H-7099-038-H</p> <p>No. 12</p>
<p>J-6090-049-A (VHJ-0103)</p> <p>No. 13</p>	<p>J-6082-066-A</p> <p>No. 14</p>	<p>J-6090-006-A (VHJ-0064)</p> <p>No. 15</p>	

## 4-2. MODE SELECTOR (VHJ-0050) HANDLING INSTRUCTIONS

The mode selector drives the loading motor of the P88 mechanism with its internal batteries (UM-2 x 4 = 6V), using LEDs to indicate the mode (EJECT, INITIAL, BRAKE, STOP/REW/FWD, STILL, PLAY, IDLER, REV) simultaneously with EJECT ⇄ REV mode changes.

Instead of the internal batteries, an external DC 6V power supply can also be used.

### 4-2-1. Part Names (See Fig. 4-2-1)

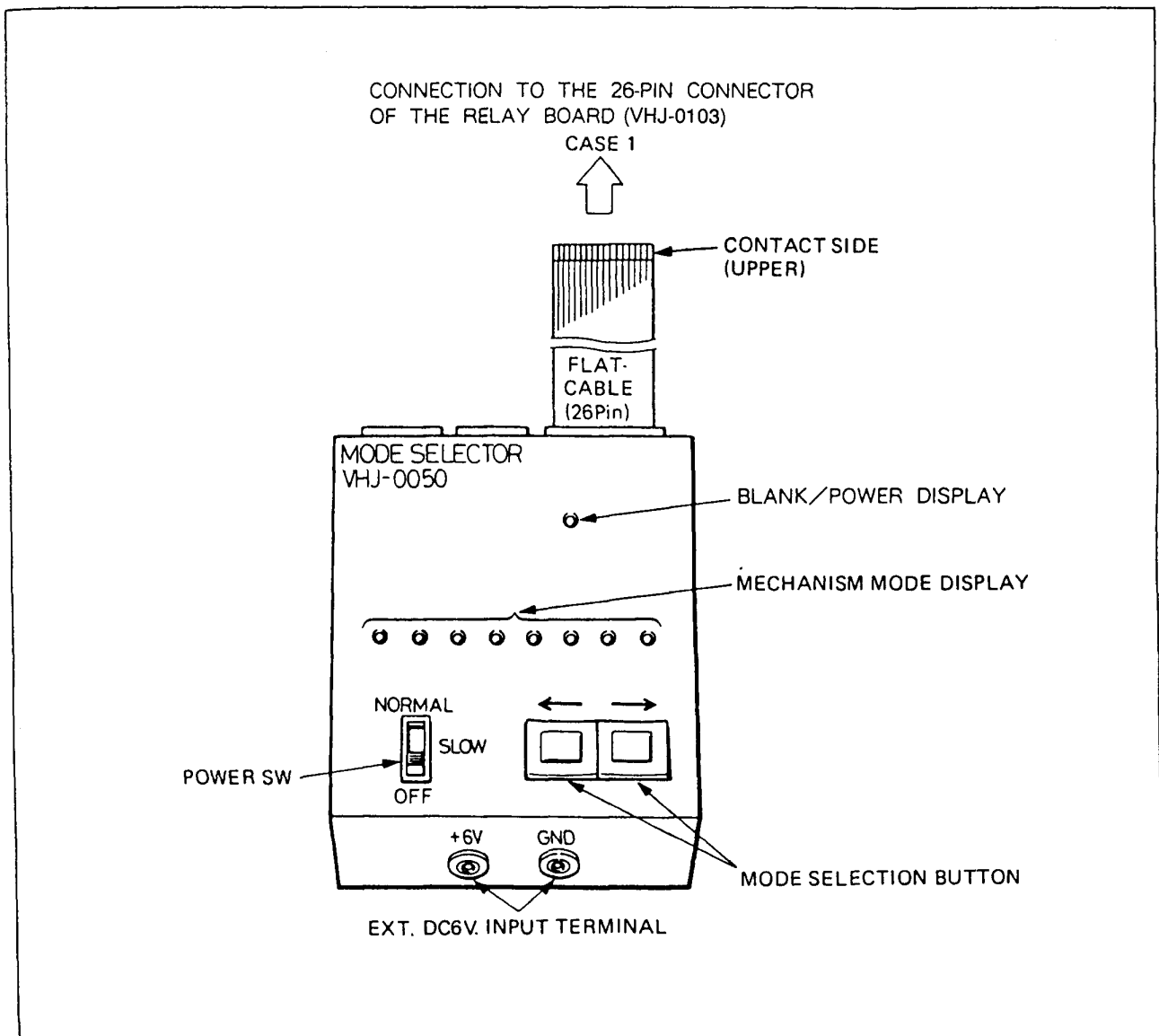
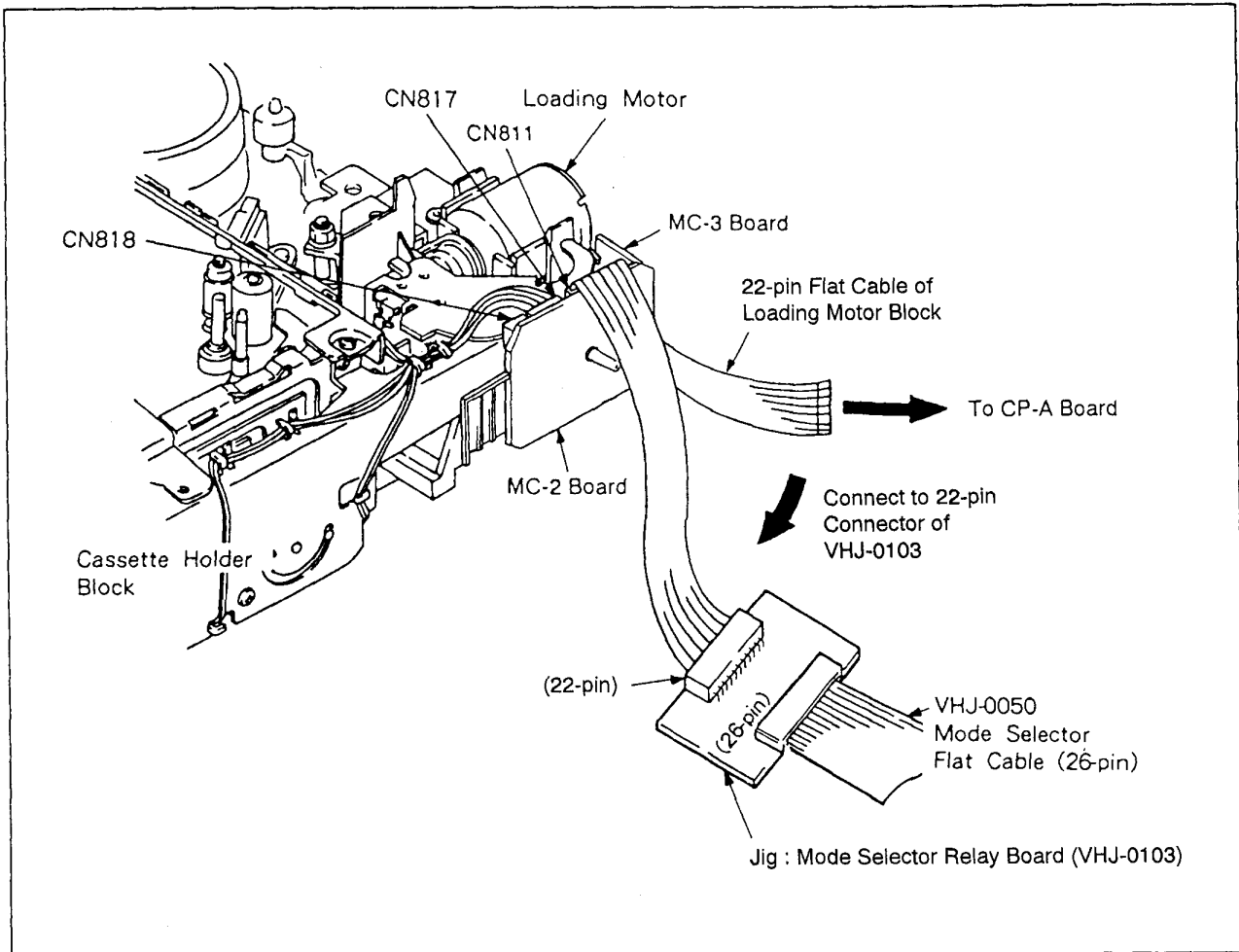


Fig. 4-2-1

**4-2-2. Connection Method (See Fig. 4-2-2)**

- 1) Remove the 22-pin flat cable extending from the COMPL MC-2 board connector (CN811) from the connector of the system control circuit board, and connect it to the 22-pin connector of the mode selector relay board (VHJ-0103).
- 2) Connect the 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) provided between the mode selector body and the 26-pin connector of the mode selector relay board (VHJ-0103).

**Note:** Care should be taken to avoid mistaking the direction of the contacting side when connecting the flexible flat cable.



**Fig. 4-2-2 Connection**

### 4-2-3. Handling Method

- 1) Keep the right side (⇒) of the mode selector key pressed, and the mode will change in the following sequence: EJECT⇒INITIAL⇒BRAKE⇒STOP/REW/FWD⇒STILL⇒PLAY⇒IDLER⇒REV.
- 2) When changing the mode in the REV⇒EJECT direction, press the left side (⇐) of the mode selector key until the desired mode is indicated.
- 3) In the mid position of each mode during a shift to other mode, the "BLANK" LED lights. But the "PLAY", "IDLER", "REV" LEDs light between the EJECT mode and the INITIAL mode. Be sure therefore to check the mechanism body to see just what state the mechanism is in. Incidentally, if the mode selector is not connected to the mechanism, the "BLANK" LED lights to indicate the power ON.
- 4) The SLOW position of POWER switch makes relatively slow motions in comparison with the NORMAL position.

**Note 1 :** The mode selector drives the loading motor only, not affecting the head drum motor and the capstan motor. When using the mode selector with a cassette loaded, turn the capstan motor manually to remove tape slackness, preventing tape entanglement.

**Note 2 :** If the left side (⇐) of the mode selector (VHJ-0050) key is kept pressed with the COMPL cassette mechanism removed, it might get past the EJECT position, causing the front helical gear and the front worm gear to get disengaged.

In this condition, since the front helical gear will not turn even if the right side (⇒) of the mode selector key is pressed, rotate (push) the front helical gear clockwise by hand and engage it with the front worm gear. In this condition, as there is a misalignment between the mechanism main body operation mode (indicated by the mode selector indicator lamps) and the front loading mechanism operation mode, keep the right side (⇒) of the mode selector key pressed until the front helical gear and the front loading gear of the front loading mechanism get back to the initial condition (Refer to A and B in Fig. 4-5-5 of section 4-5-2. Loading Motor).

When the front loading mechanism returns to the initial condition, operation mode of the whole mechanism gets back to normal, matching the mode shown by the mode selector indicator lamps (mode is not properly indicated, however, during EJECT to INITIAL).

Sometimes, engagement of the front helical gear with the front worm gear is delayed, operation mode of the mechanism main body gets too much ahead and the front loading mechanism mode cannot be switched to the initial condition. In that case, press the left side (⇐) of the mode selector key, setting the mechanism main body operation mode back to EJECT (rotation of the mode cam and the MAIN CAM stops).

**Note 3 :** The mode selector indicator lamps show the mechanism operation mode, but the EJECT lamp may sometimes fail to indicate the actual mechanism operation mode.

## 5. MECHANISM DISMANTLING AND REASSEMBLING

### 5-1. MECHANISM MAIN UNIT (See Fig. 5-1-1.)

#### 1. Removal

- 1) Remove the connectors of the COMPL MC-3 and the COMPL HEAD BRACKET.
- 2) Remove the flexible cable ① connecting the COMPL CYLINDER to the PRE-AMP UNIT ③ (See Fig. A).
- 3) Remove the two screws ②, then remove the PRE-AMP UNIT ③.
- 4) Remove the screw ④, then remove the PRE-AMP BRACKET ⑤.
- 5) Remove the two screws ⑥.
- 6) Remove the three screws ⑦ and two screws ⑩, then lift up the mechanism main unit and remove it.

Since the TRAY ⑧ obstructs removal of the two front screws ⑩, move the TRAY LOCK LEVER ⑨ in the direction of the arrow to unlock, then slide the TRAY ⑧ before removing the screws. (See Fig. B)

**Note:** Shape of the PRE-AMP UNIT ③ and the PRE-AMP BRACKET ⑤ differ depending on the model.

#### 2. Remounting

- 1) Mount the mechanism main unit onto the chassis with the three screws ⑦ and two screws ⑩.
- 2) Tighten the two screws ⑥.
- 3) Mount the PRE-AMP BRACKET ⑤ with the two screws ④.
- 4) Mount the PRE-AMP UNIT ③ and the ground lug with the two screws ② (some models are not provided with a ground lug).
- 5) Insert the flexible cable ① into the connector of the PRE-AMP UNIT.
- 6) Connect the connectors of COMPL MC-3 and COMPL HEAD BRACKET.

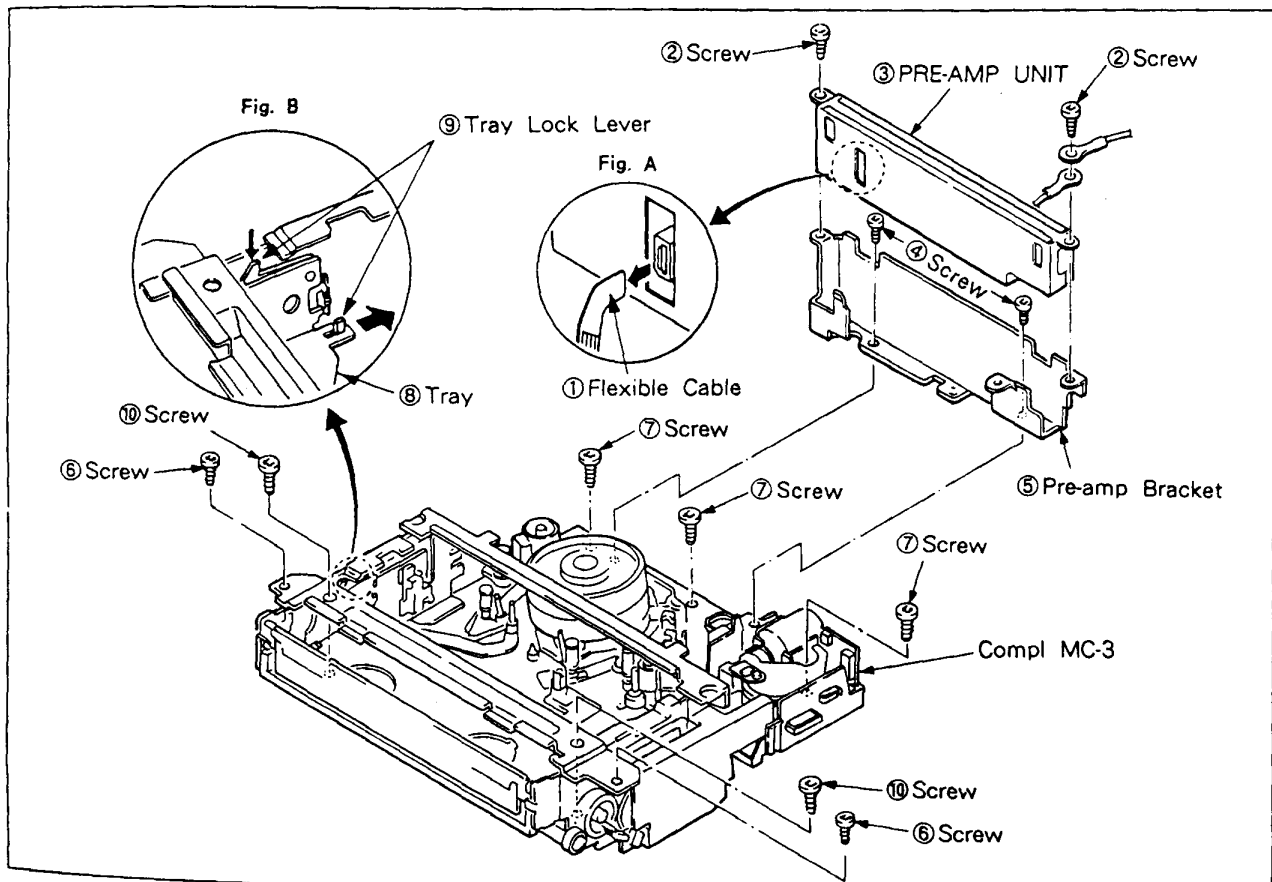


Fig. 5-1-1 Mecahnism Main Unit

## 5-2. CASSETTE HOLDER MECHANISM

### 5-2-1. COMPL Cassette Mechanism (See Fig. 5-2-1.)

#### 1. Removal

- 1) Set the video main unit to the EJECT completed mode.
- 2) Pull out the connectors (6-PIN CONNECTOR connected to the system control circuit board, ACE HEAD CONNECTOR, and FTE HEAD CONNECTOR) from CASSETTE HOLDER.
- 3) Remove the two screws ①.
- 4) Remove the two screws ②.
- 5) Lift up the COMPL CASSETTE MECHANISM ④ back a little and remove the two hooks ③ on the front (See Fig. B). When doing so, make sure that the SAFETY SWITCH LEVER is not caught by the mechanism chassis.

#### 2. Remounting

- 1) Set the chassis section mechanism to the EJECT mode with the mode selector (VHJ-0050) (looking from above, match the front loading gear hole ⑤ with the MOTOR HOLDER hole ⑥ as shown in Fig. A).
- 2) Set the COMPL CASSETTE MECHANISM ④ to the EJECT completed mode.
- 3) Mount the COMPL CASSETTE MECHANISM ④ onto the mechanism chassis, aligning it with the protuberance. Match positions of the FRONT LOADING GEAR  $\Delta$  mark ⑦ and the RACK EJECT mark ⑧. (See Fig. A.)
- 4) Fix to the mechanism chassis with the two screws ②.
- 5) Fix to the chassis with the screw ①.
- 6) Connect to the various connectors.

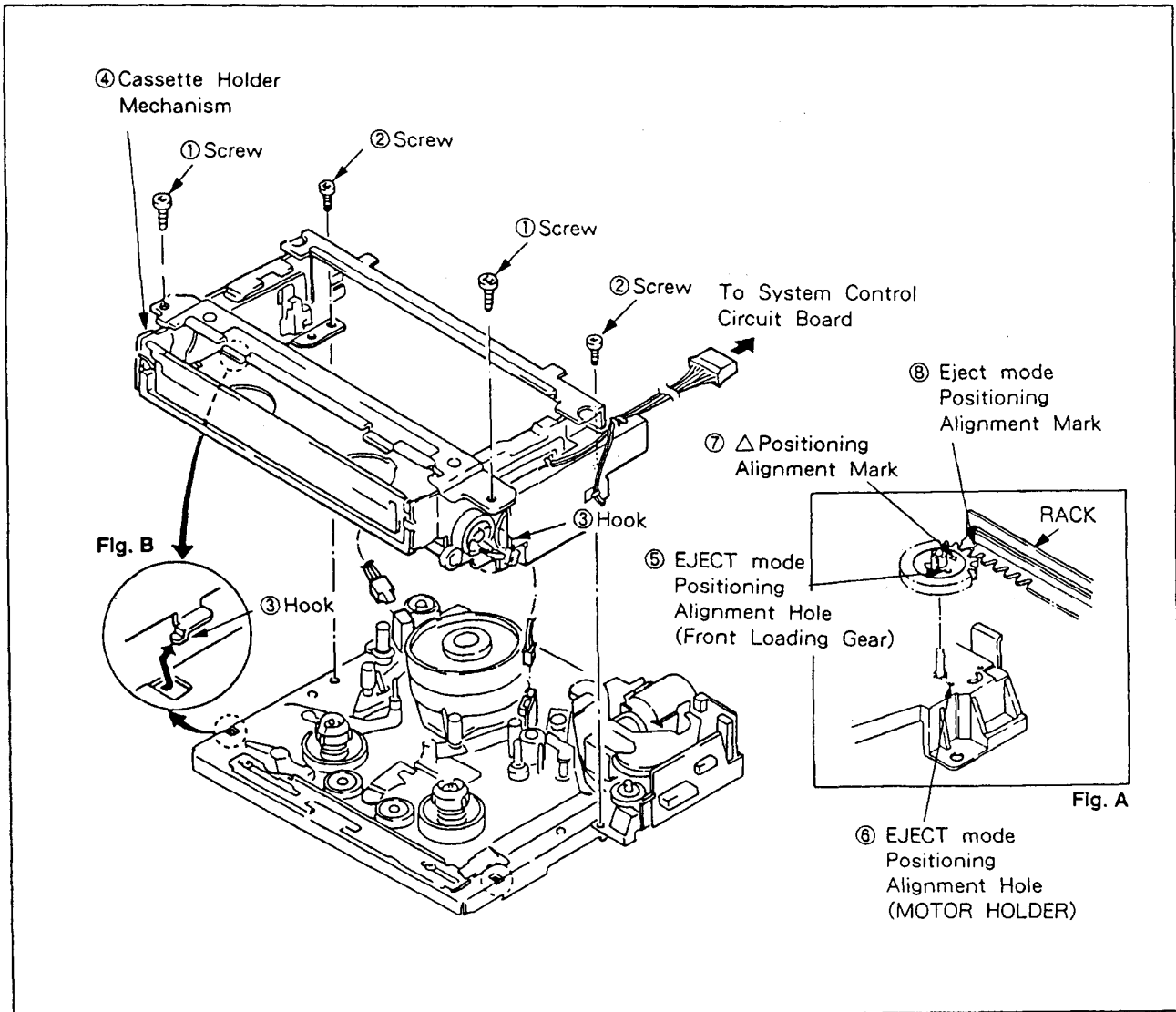


Fig. 5-2-1 Compl Cassette Mechanism



**5-2-2. Gear Bracket Ass'y (See Fig. 5-2-2.)**

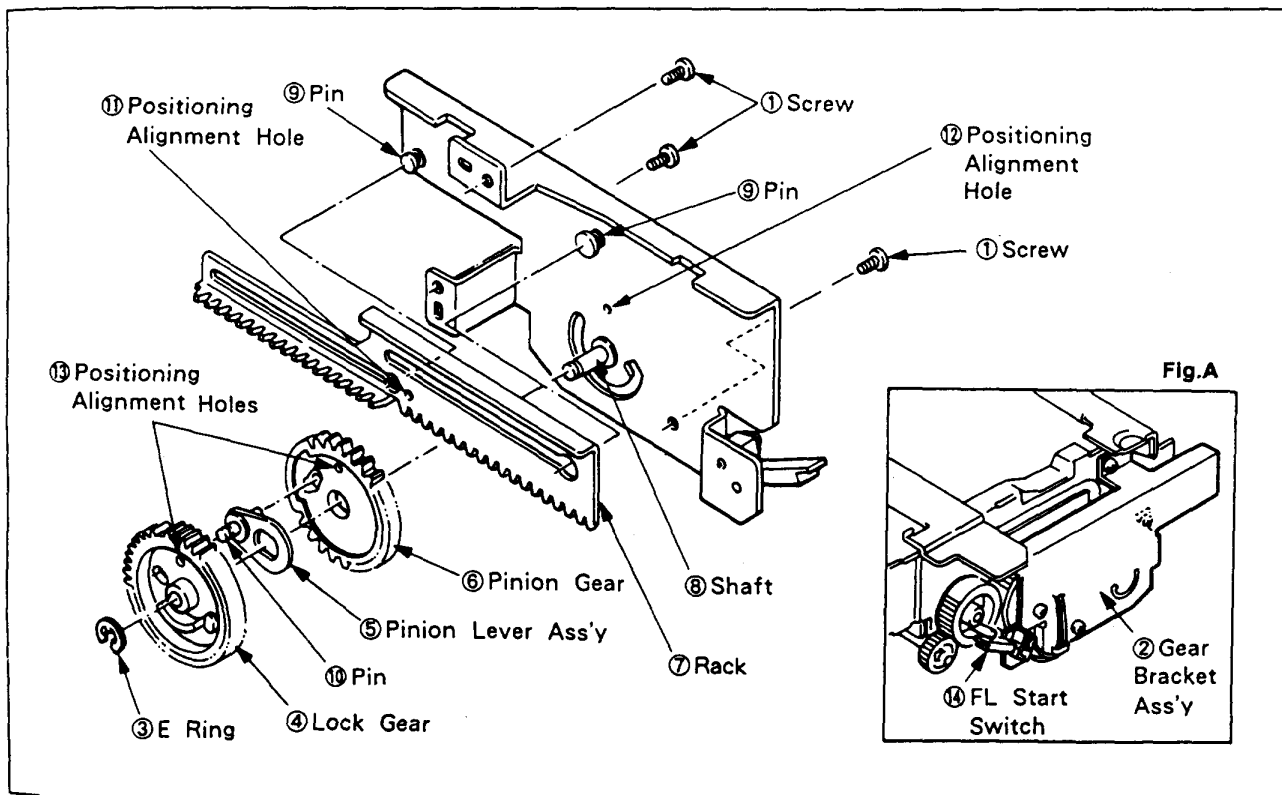
**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the three screws ①, then remove the GEAR BRACKET ASS'Y ② as shown in Fig. A.
- 3) Remove the E ring ③, then remove the LOCK GEAR ④, the PINION LEVER ASS'Y ⑤, the PINION GEAR ⑥ and the RACK ⑦, in that order.

**2. Remounting**

- 1) Apply grease to the shaft ⑧ and the two pins ⑨ of the GEAR BRACKET ASS'Y.
- 2) Apply grease to the pin ⑩ of the PINION LEVER ASS'Y.
- 3) Apply grease to the toothed part of the RACK ⑦.
- 4) Fit the RACK ⑦ onto the two pins ⑨. Align the positioning alignment hole ⑪ to the positioning alignment hole ⑫ of the GEAR BRACKET.

- 5) Mount the PINION GEAR ⑥, PINION LEVER ASS'Y ⑤, and LOCK GEAR ④ in the shaft ⑧ in the order mentioned.
- Align the positioning alignment holes ⑬ of PINION GEAR and LOCK GEAR with the positioning alignment hole ⑪ of RACK at that time.
- 6) Mount the E ring ③ onto the shaft ⑧.
- 7) Set the GEAR BRACKET ASS'Y ② to the dowel and mount it using three screws ①.
- Align the positioning alignment hole ⑭ of the IDLER GEAR with the positioning alignment hole ⑮ of the SIDE BOARD as shown in Fig. 5-2-3 at this time.
- Also align the positioning alignment holes ⑬ of PINION GEAR and LOCK GEAR with the positioning alignment hole ⑫ of GEAR BRACKET by referring to Fig. 5-2-2. After mounting them, check to be sure that FL START SWITCH ⑭ is in the ON state shown in Fig. A.
- 8) Remount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.



**Fig. 5-2-2. Gear Bracket Ass'y**

**5-2-3. Cassette Drive Gear (Right) (See Fig. 5-2-3.)**

**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM and the GEAR BRACKET ASS'Y as instructed in 5-2-1. and 5-2-2., respectively.
- 2) Remove the IDLER GEAR ①.
- 3) Remove the SPRING COIL ②, then remove the MAIN GEAR ③.
- 4) Remove the E ring ④, then remove the LEVER GEAR ASS'Y R ⑤.
- 5) Open the hook ⑥ and remove the COUPLE GEAR R ⑦. Take care not to open the hook ⑥ too much, otherwise it may get deformed or broken. If it does, replace it.
- 6) Remove the IDLER GEAR R ⑧.

**2. Remounting**

- 1) Apply grease to gear parts that undergo friction.
- 2) Mount the IDLER GEAR R ⑧ onto the axle ⑨.
- 3) Mount the COUPLE GEAR R ⑦ onto the ROD ASS'Y axle ⑩. When doing so, match the couple gear position with the IDLER GEAR R ⑧ as shown in Fig. A.
- 4) Mount the LEVER GEAR ASS'Y R ⑤ onto the axles ⑪ and ⑫. Match position to the IDLER GEAR R ⑧ as shown in Fig. A.
- 5) Mount the E ring ④ onto the axle ⑫.
- 6) Mount the MAIN GEAR ③ onto the axle ⑪. When doing so, match position to the IDLER GEAR R ⑧ as shown in Fig. A.
- 7) Hook the SPRING COIL ② to the notch ⑬ in the MAIN GEAR R ③ and the LEVER GEAR ASS'Y R.
- 8) Mount the IDLER GEAR ① onto the axle ⑭. When doing so, match position to the MAIN GEAR as shown in Fig. A.
- 9) Mount the GEAR BRACKET ASS'Y and the COMPL CASSETTE MECHANISM ASS'Y as instructed in 5-2-2. and 5-2-1., respectively.

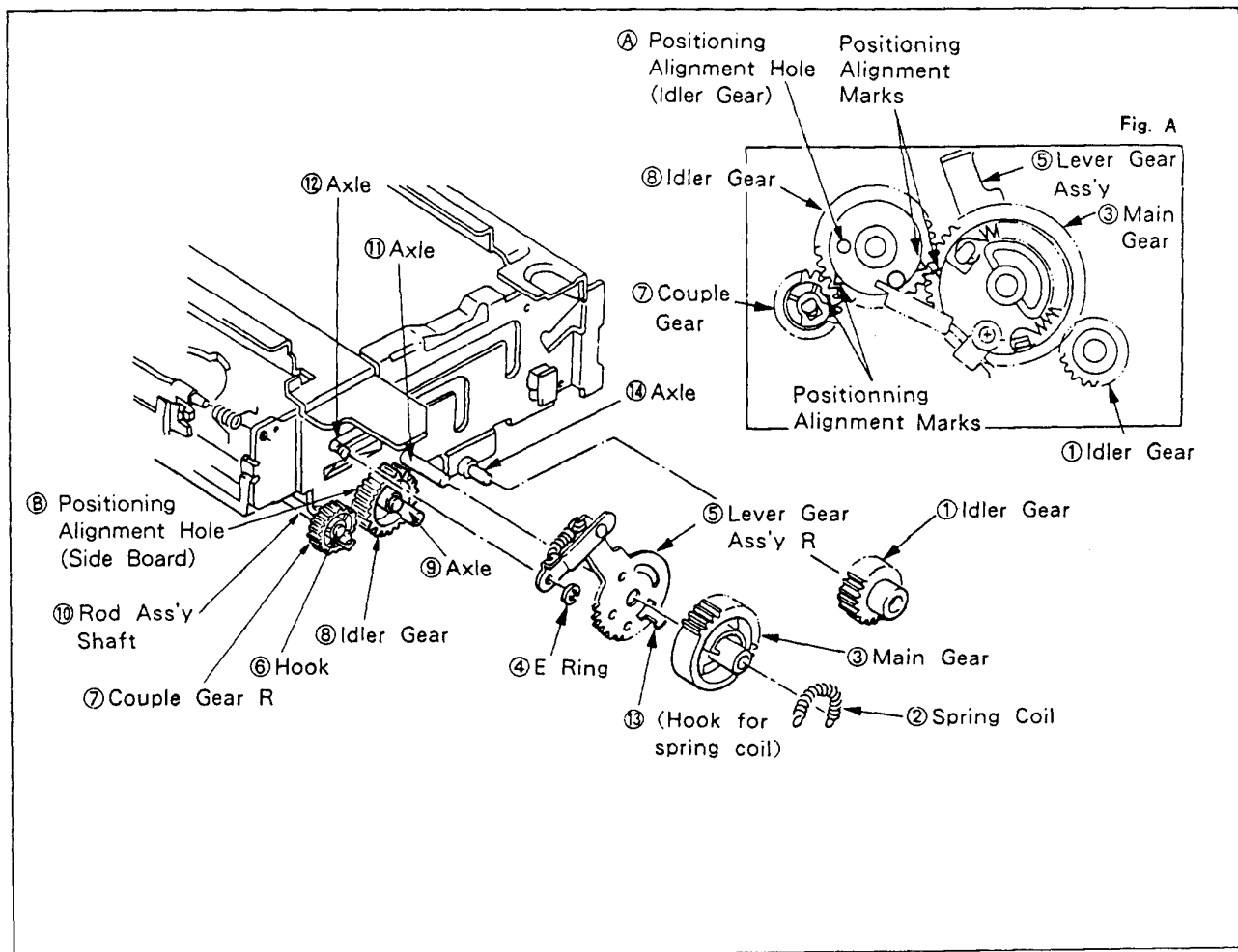


Fig. 5-2-3. Cassette Drive Gears (Right Side)

**5-2-4. Cassette Drive Gear (Left)**  
(See Fig. 5-2-4)

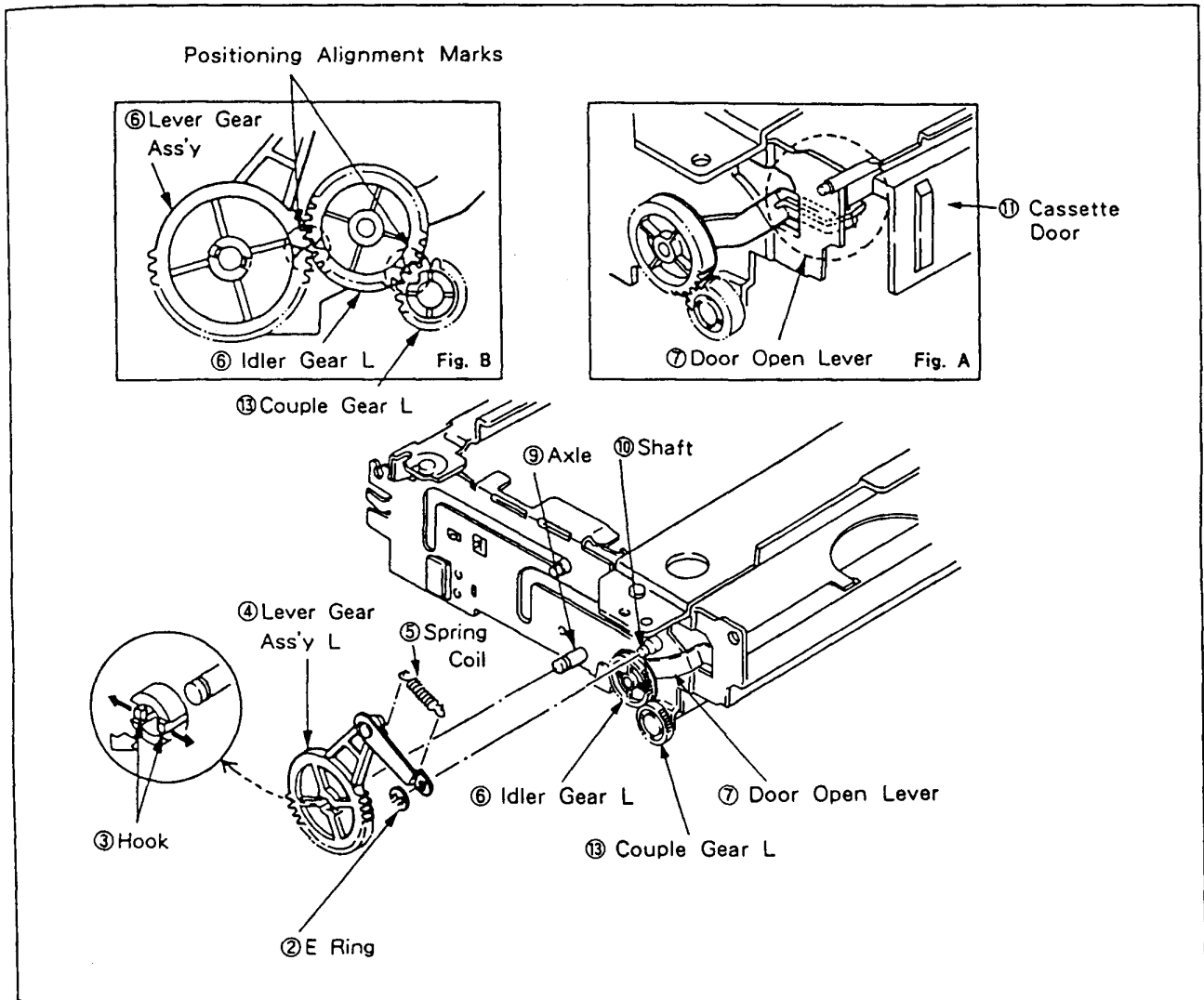
**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the E ring ②.
- 3) Open the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
- 4) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y L ④.

**2. Remounting**

- 1) Apply grease to the axle ⑨ and shaft ⑩.
- 2) Align with the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig. B.
- 3) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
- 4) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Align with the IDLER GEAR L ⑥ as shown in Fig. B.
- 5) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

**Note:** The end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig. A.



**Fig. 5-2-4. Cassette Drive Gears (Left Side)**

5-2-5. FL Start Switch (See Fig. 5-2-5.)

1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the screw ①.
- 3) Remove the lead wire of the FL START SWITCH ②.

2. Remounting

- 1) Solder the lead wire to the FL START SWITCH ② terminal.
- 2) Align the FL START SWITCH ② protuberance to the hole ⑤, then mount it onto the GEAR BRACKET ASS'Y ③ with the screw ①. Do it so that the FL START SWITCH ② is turned ON by holding the pin ④ of IDLER GEAR in the EJECT completed mode.
- 3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

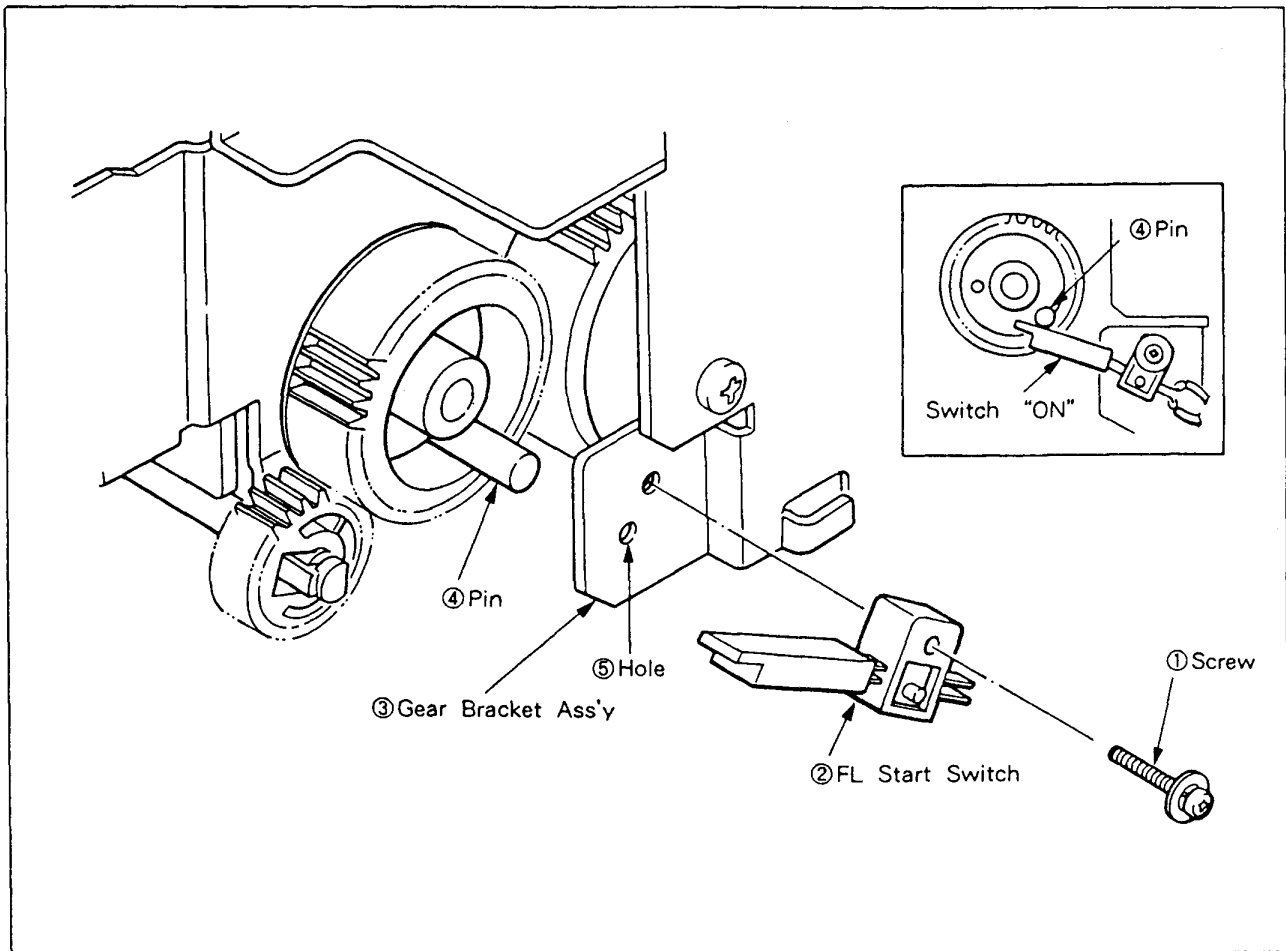


Fig. 5-2-5. FL Start Switch

**5-2-6. T-Top Sensor, T-End Sensor (See Fig. 5-2-6.)**

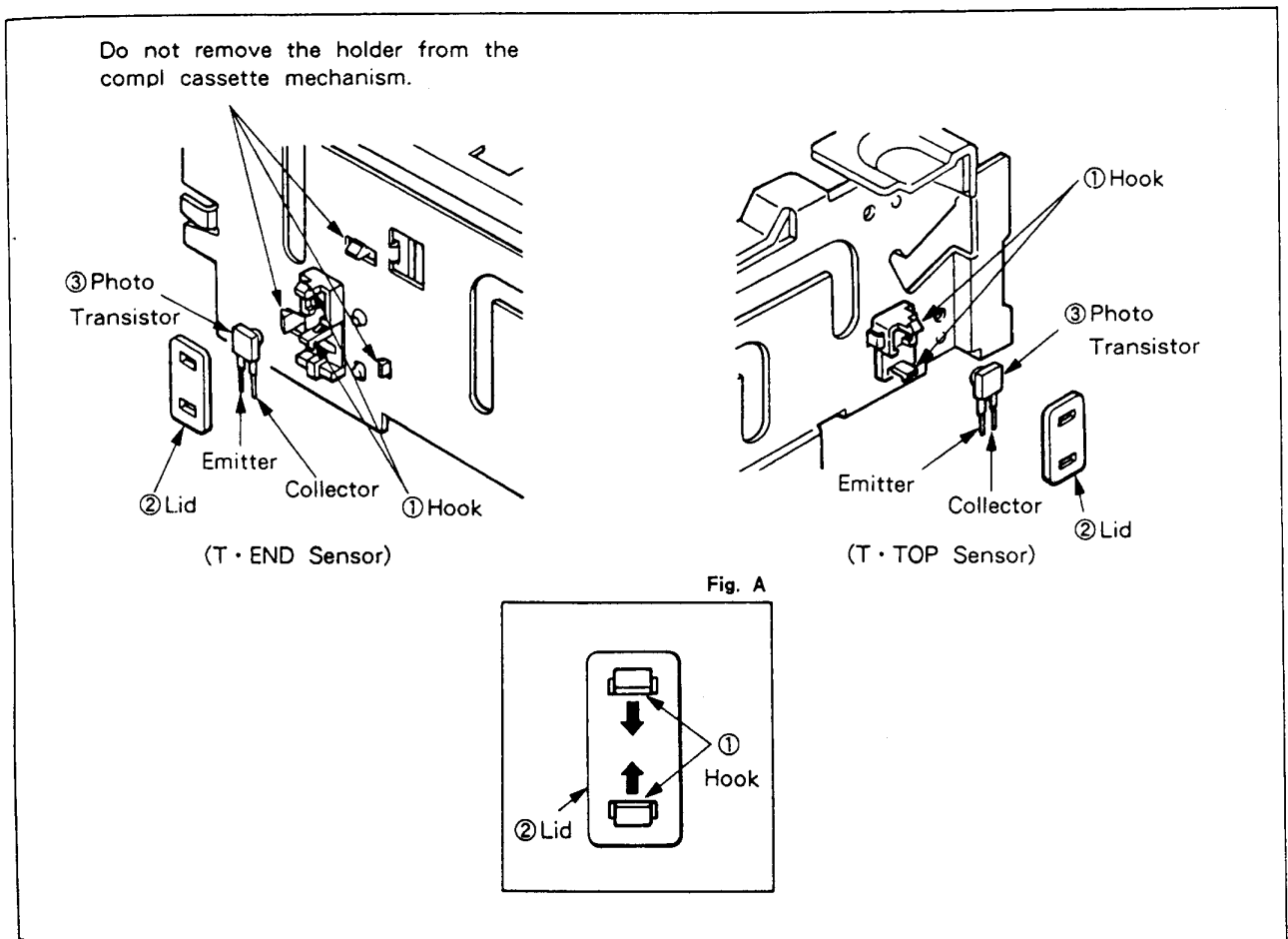
**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) When removing the T-TOP SENSOR, remove the GEAR BRACKET ASS'Y as instructed in 5-2-2.
- 3) Unhook the hook ① as instructed in Fig. A, then remove the LID ②. Take care not to push the hook ① too much, otherwise it may be deformed or broken.
- 4) Remove the phototransistors ③, then remove the lead wire.

**Note :** Mounting position of the transistor holder on the T-END SENSOR side is precisely adjusted at the factory, so do never remove it from the COMPL CASSETTE MECHANISM.

**2. Remounting**

- 1) Solder the brown lead wire to the emitter side, and the red lead wire to the collector side of the T-TOP SENSOR phototransistor ③. Solder the orange lead wire to the emitter side, and the yellow lead wire to the collector side of the T-END SENSOR phototransistor.
- 2) Mount the phototransistors ③ onto their respective holders.
- 3) Mount the LID ② and fix it with the hook ①.
- 4) Mount the GEAR BRACKET ASS'Y as instructed in 5-2-2.
- 5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.



**Fig. 5-2-6. T TOP Sensor & T END Sensor**

### 5-3. COMPL HOLDER MOTOR (LOADING MOTOR BLOCK)

#### 5-3-1. COMPL Motor Bracket

##### 1. Removal

- 1) Remove the PRE-AMP UNIT and the PRE-AMP BRACKET as instructed in 5-1.
- 2) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 3) Remove the two screws ① and the other one ⑩, then remove the COMPL HOLDER MOTOR ② (see Fig. 5-3-1.).

##### 2. Remounting

- 1) Set the mechanism chassis to the INITIAL mode. In this mode, look at the mechanism chassis positioning holes ③ just from above and align the MAIN CAM ④ and MODE CAM ⑤ positioning holes as shown in Fig. A.
- 2) Set the COMPL HOLDER MOTOR ② to the INITIAL mode with the mode selector (VHJ-0050). In this position, the FRONT LOADING

GEAR  $\Delta$  mark ⑥ is aligned with the MOTOR HOLDER INITIAL mode position mark ⑦ (see Fig. B.).

- 3) Align the ROTARY SWITCH (mode detector switch) ⑧ with the INITIAL mode position mark ⑨ (see Fig. C.).
- 4) Align the COMPL HOLDER MOTOR main unit ② with the protuberance ⑪, then mount it with the two screws ① and the other one ⑩.
- 5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 6) Mount the PRE-AMP UNIT and the PRE-AMP BRACKET as instructed in 5-1.

**Note:** Normal mechanism operation cannot be achieved if initial positioning of the MAIN CAM ④, the MODE CAM ⑤ and the ROTARY SWITCH (mode detector switch) ⑧ are not performed precisely.

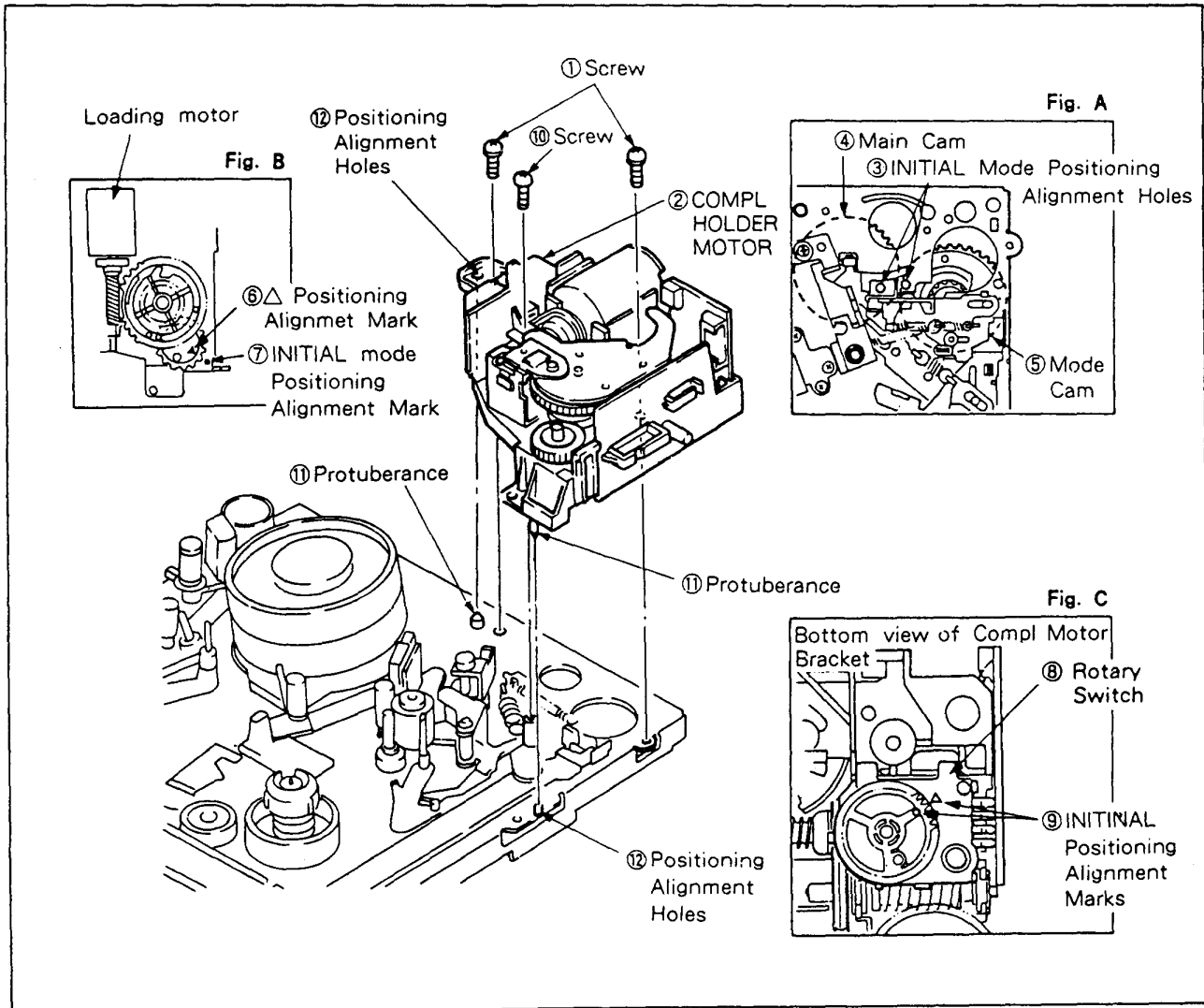


Fig. 5-3-1 Compl Holder Motor

### 5-3-2. Loading Motor (Refer to Fig. 5-3-2.)

#### 1. Removal

LOADING MOTOR can be replaced after LOADING MOTOR BLOCK unit has been removed by referring to 5-3-1. The 1990 version of the mechanism allows LOADING MOTOR itself to be replaced without removing CASSETTE HOLDER BLOCK and LOADING MOTOR BLOCK. The following describes this procedure.

- 1) Use MODE SELECTOR (VHJ-0050) to set the mechanism to the initial mode.
- 2) Remove the connector for DEW SENSOR connected to the MC-3 board ①.
- 3) Remove three screws ② and remove HOLDER BRACKET ④ with FRONT WORM ASS'Y ③ still attached.
- 4) Remove DAMPER ⑥ attached to the pulley of LOADING MOTOR ⑤.
- 5) Remove FRONT HELICAL GEAR ⑦ and WASHER ⑧.
- 6) Remove soldered LEAD WIRE from the terminal of LOADING MOTOR ⑤.
- 7) Remove LOADING BELT ⑨.
- 8) Remove LOADING MOTOR ⑤ by lifting up from the back terminal side.

#### 2. Remounting

Before attaching LOADING MOTOR ⑤ to MOTOR BRACKET ASS'Y ⑩, confirm DAMPER ① and DAMPER ⑫ shown in Fig. 5-3-5. are in the proper position on MOTOR BRACKET ASS'Y ⑩.

- 1) LOADING MOTOR ⑤ puts REAR SIDE BOSS ⑬ in the slit ⑭ of MOTOR HOLDER ⑩.  
Further, mount the tap hole ⑮ at two points of the front pulley side so that the it is secured to the PROTUBERANCE ⑯ of the MOTOR HOLDER at two points.
- 2) Solder the lead wire from the MC-3 board to LOADING MOTOR ⑤ terminal. (Solder the red lead wire to the positive terminal side.)
- 3) Hang LOADING BELT ⑨ on the pulley.
- 4) After hanging BELT ⑨ on the pulley, confirm that the mechanism unit is in the initial mode. The initial mode is indicated by Fig. A of Fig. 5-3-2., and is the position in which INITIAL POSITIONING ALIGNMENT HOLES of MAIN CAM ⑰ and MODE CAM ⑱ are lined up with THROUGH HOLE ⑲ of MOTOR HOLDER. If the initial mode is not selected, adjust with MODE SELECTOR (VHJ-0050).
- 5) As shown in Fig. B, confirm the positions of the  $\Delta$  POSITIONING ALIGNMENT MARK on FRONT LOAD GEAR ⑲ and INITIAL MARK ⑳ position of MOTOR HOLDER and the position relationship of CASSETTE HOLDER RACK ㉑.
- 6) Apply a light coat of grease to the entire sides of AXLE ㉒ and FRONT HELICAL GEAR ⑦.
- 7) Attach FRONT HELICAL GEAR ⑦ and WASHER ⑧ to AXLE ㉒. As shown in Fig. C, FRONT HELICAL GEAR ⑦ is attached so that the indent on the side is inside PIN ㉓ of FRONT LEVER ASS'Y.
- 8) Attach DAMPER ⑥ to LOADING MOTOR ⑤ pulley.
- 9) HOLDER BRACKET ④ is attached by engaging FRONT WORM ASS'Y ③ with LOADING MOTOR ⑤ pulley, and held in place with three screws ②.
- 10) Attach the connector of DEW SENSOR ㉔ to the MC-3 board ① and return the mechanism to the eject completion using MODE SELECTOR.



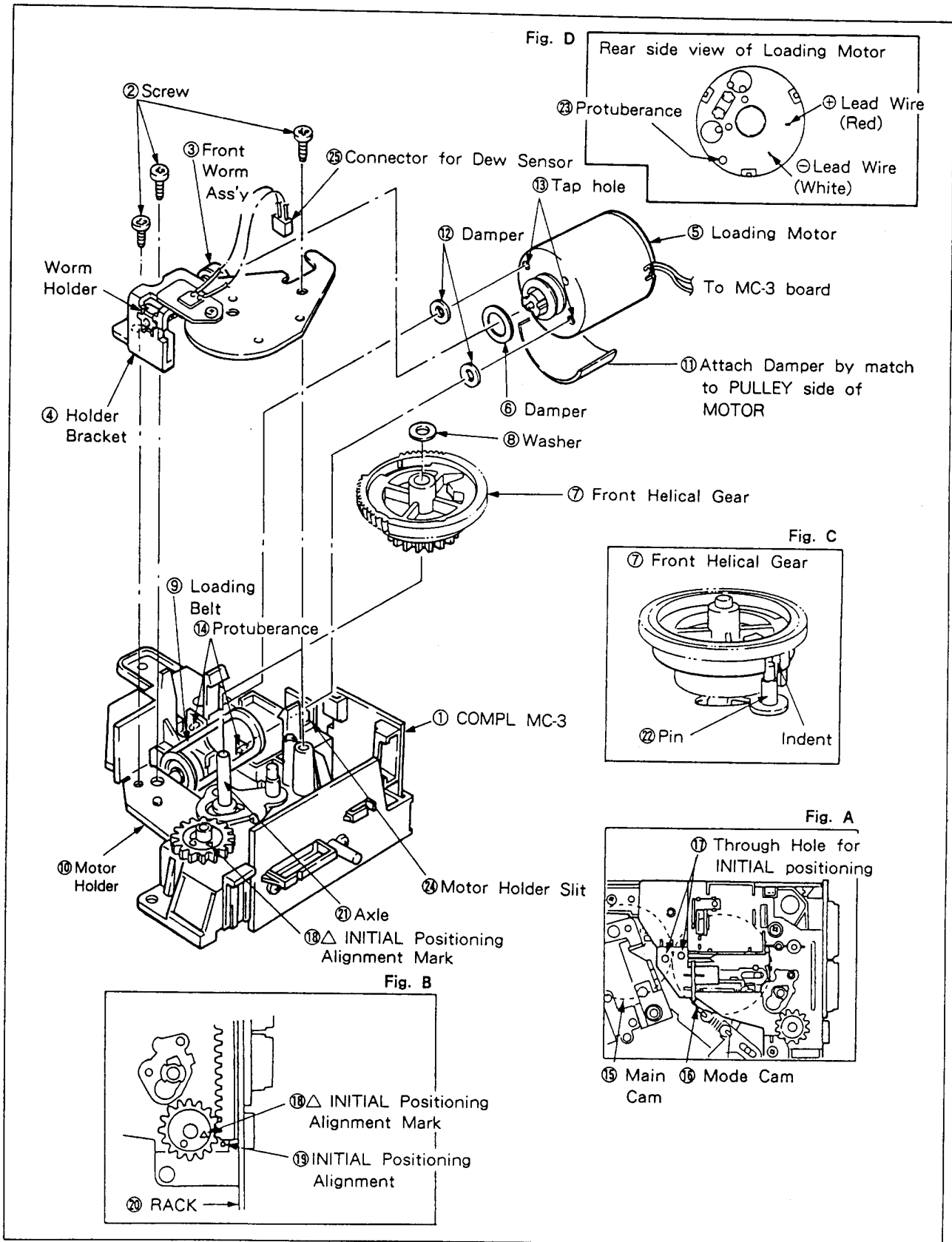


Fig. 5-3-2. Loading Motor



## 5-4. TAPE LOADING MECHANISM

### 5-4-1. Main Parts of the Tape Loading Mechanism (See Fig. 5-4-1.)

#### 1. Removal

- 1) Remove connectors from the DRUM MOTOR board (SV-5).
- 2) Remove the three screws ①, then remove the REINFORCE BRACKET ②.
- 3) Remove the three special washers ③ and ⑦, then remove the spacer ⑥, LOAD RACK ④ and MAIN CAM ⑧.
- 4) Unhook the LOAD GEAR T hook ⑩, then remove the LOAD GEAR T ⑨ as shown in Fig. A, with the SPRING COIL ⑪ and the LOAD LEVER ASS'Y T ⑫ attached to it.
- 5) Unhook the LOAD GEAR S hook ⑭, then remove the LOAD GEAR S ⑬ as shown in Fig. B, with the SPRING COIL ⑮ and the LOAD LEVER ASS'Y S ⑯ attached to it.

**Note:** Take care not to open the LOAD GEAR hooks too much, otherwise they may be deformed or broken. If they are, replace them.

#### 2. Remounting

- 1) Apply grease to the hole ⑰ of the LOAD LEVER ASS'Y S ⑯, as shown in Fig. B.
- 2) Apply grease to the hole ⑱ of the LOAD LEVER ASS'Y T ⑫ as shown in Fig. A, and to the sections of the LOAD GEAR T ⑨ as indicated with an arrow in Fig. C.
- 3) Apply grease to GROOVE 1, GROOVE 2 and to the outer side of the MAIN CAM ⑧, shown in Fig. E.
- 4) Apply grease to the three oval holes of the LOAD RACK ④ as shown in Fig. D.
- 5) Apply grease to the outer surface of axles ⑲, ⑳ and ㉑.
- 6) After assembling as shown in Fig. B, mount the LOAD GEAR S ⑬ onto the axle ⑲. Insert the ROLLER BASE S pin ㉒ into the hole ⑰ of the LOAD LEVER ASS'Y S.
- 7) After assembling as shown in Fig. A, mount the LOAD GEAR T ⑨ onto the axle ㉑. When doing so, align the INITIAL mode positioning alignment holes ㉓ of the LOAD GEAR S ⑬ and the LOAD GEAR T ⑨ to the INITIAL mode position. Insert the ROLLER BASE T pin ㉔ into the hole ⑱ of the LOAD LEVER ASS'Y T ⑫.
- 8) Mount the MAIN CAM ⑧ onto the axle ㉑. At that time, make sure that the INITIAL mode positioning alignment holes ㉕ of the MAIN CAM ⑧ and the MODE CAM ㉖ match the INITIAL mode positioning alignment holes ㉗ of the MECHANISM CHASSIS. Also check to be sure that the pin ㉘ of the CAM PINCH LEVER ASS'Y is put in the GROOVE 1 of the MAIN CAM as shown in Fig. E.
- 9) Mount the LOAD RACK ④ onto the axles ㉑ and ㉒. At that time, set the INITIAL mode positioning alignment marks ㉙ of the LOAD RACK ④ and the LOAD GEAR T ⑨ to the INITIAL mode position. Insert the LOAD RACK pin ㉚ into the MAIN CAM GROOVE 2 as shown in Fig. E.
- 10) Mount the spacer ⑥ and the special washer ⑦ onto the axle ㉑.
- 11) Mount the two special washers ③ onto the two axles ㉒.
- 12) Mount the REINFORCE BRACKET ② with the three screws ①.
- 13) Insert the connector into the DRUM MOTOR board (SV-5).
- 14) Confirm that loading and unloading are performed smoothly.

**Note:** Be sure to perform INITIAL mode positioning of cams and gears precisely.

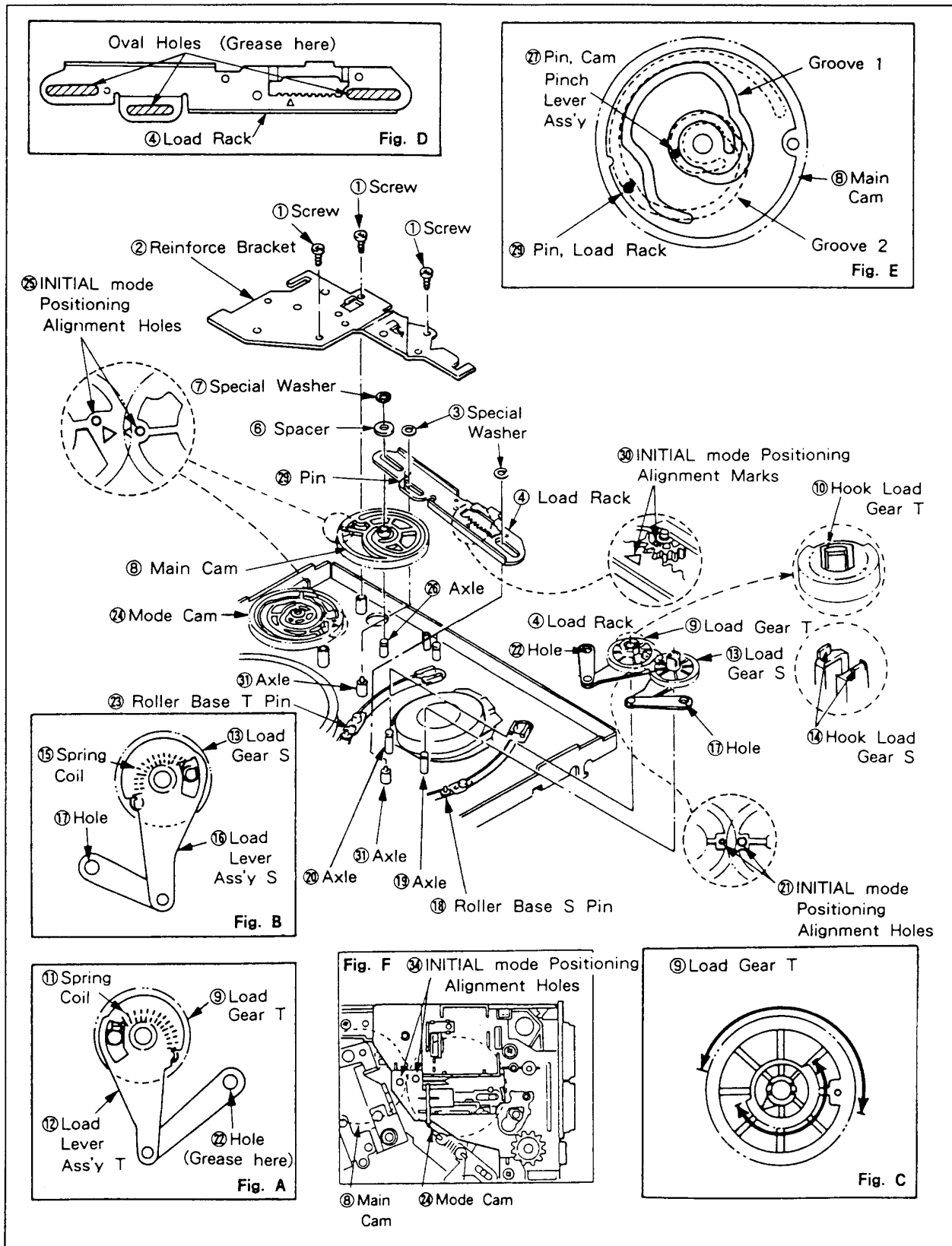


Fig. 5-4-1. Loading Mechanism Main Parts

5-4-2. Mode Cam (See Fig. 5-4-2.)

1. Removal

- 1) Set the INITIAL mode with the mode selector (VHJ-0050).
- 2) Remove the REINFORCE BRACKET as instructed in 5-4-1.
- 3) Remove the two stop washers ①, then remove the CAM PLATE SLIDE ASS'Y ②.
- 4) Remove the MODE CAM ③.

2. Remounting

- 1) Referring to 5-4-1., confirm that the MAIN CAM is in the INITIAL mode position.
- 2) In case the MAIN CAM is misplaced, use the mode selector (VHJ-0050) to align the MAIN CAM positioning hole with the chassis INITIAL mode position hole (refer to 5-4-1. for the INITIAL mode position). Since the ROTARY SWITCH (mode detector switch) does not rotate, the mode selector indicator lamp will not show the correct mode.
- 3) Align the ROTARY SWITCH (mode detector switch) ④ with the INITIAL mode position mark ⑤ as shown in Fig. A.
- 4) Mount the MODE CAM ③ onto the axle ⑥. Do it so that the SLIDE CAM ASS'Y pin ⑪ is placed in the GROOVE 3 as shown in Fig. B.
- 5) Mount the CAM PLATE SLIDE ASS'Y ② onto the axles ⑥ and ⑦. Do it so that the pin ⑧ gets into the GROOVE 4 of the MODE CAM as shown in Fig. B, and the point ⑨ of the bent-up part into the ACT PLATE SLIDE ASS'Y hole ⑩.
- 6) Mount the two special washers ① onto the axles ⑥ and ⑦.
- 7) Mount the REINFORCE BRACKET as instructed in 5-4-1.

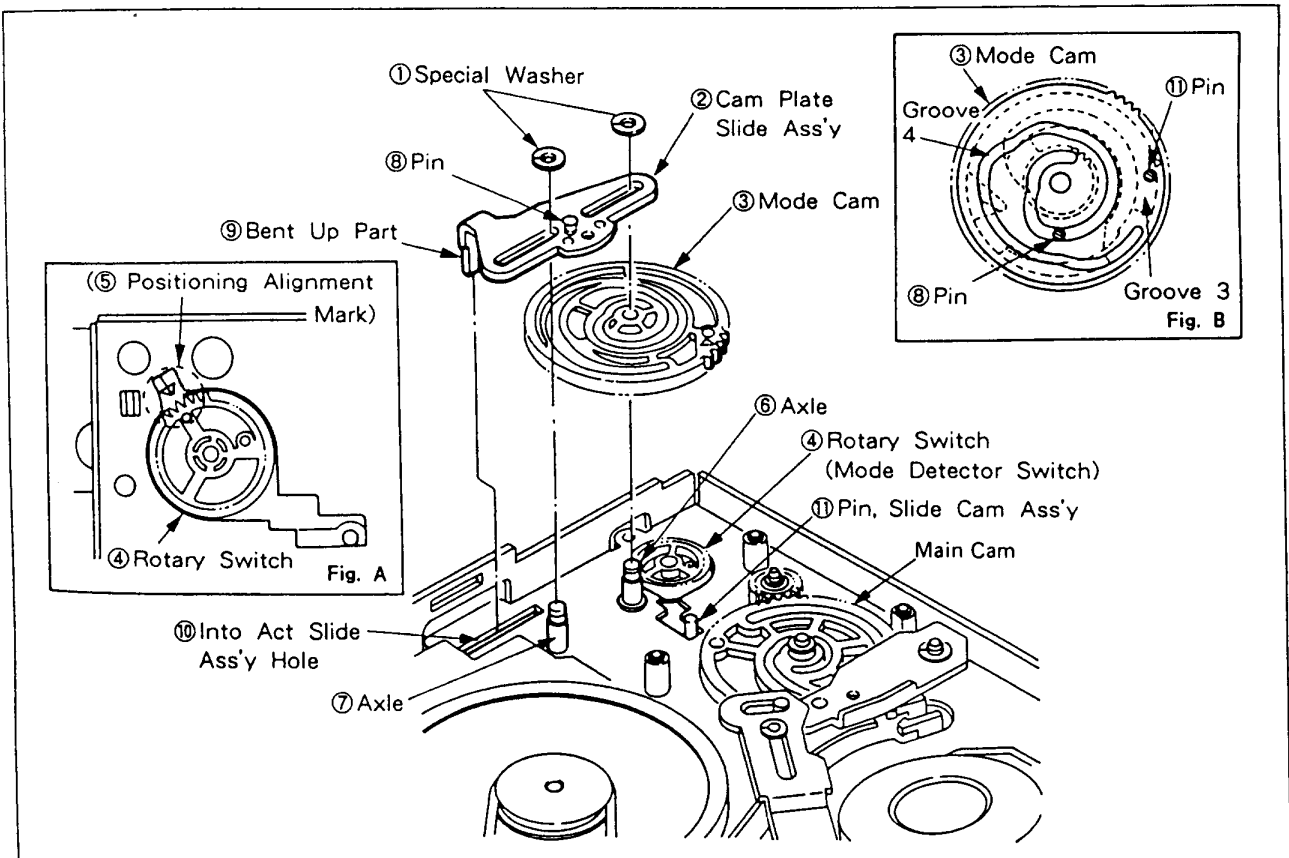


Fig. 5-4-2. Mode Cam

**5.5. COMPL HEAD BRACKET (ACE HEAD)**  
(See Fig. 5-5-1.)

**1. Removal**

- 1) Remove the COMPL HEAD BRACKET special mounting nut ②.
- 2) Remove the SLEEVE ③, the COMPL HEAD BRACKET ① and the ACE HEAD SPRING COIL ④, in that order.

**Note :** Take care not to scratch or soil the ACE head surface.

**2. Remounting**

- 1) Apply grease to the axle ⑥ as shown in Fig. A.
- 2) Apply grease to the spot where the COMPL HEAD BRACKET ① makes contact with the STOPPER ⑦ (See Fig. A).
- 3) Mount the ACE HEAD SPRING COIL ④ and the COMPL HEAD BRACKET ①, in that order, onto the axle ⑥. Hook one end of the ACE HEAD SPRING COIL ④ to the notch ⑤, and the other end to the COMPL HEAD BRACKET, so that the COMPL HEAD BRACKET is pressed against the STOPPER ⑦ (See Fig. A).
- 4) Mount the SPECIAL NUT ② onto the axle ⑥ through the SLEEVE ③.
- 5) Clean the ACE head surface with a chamois leather moistened with methyl alcohol.
- 6) Perform ACE head adjustment as instructed in 6-4.

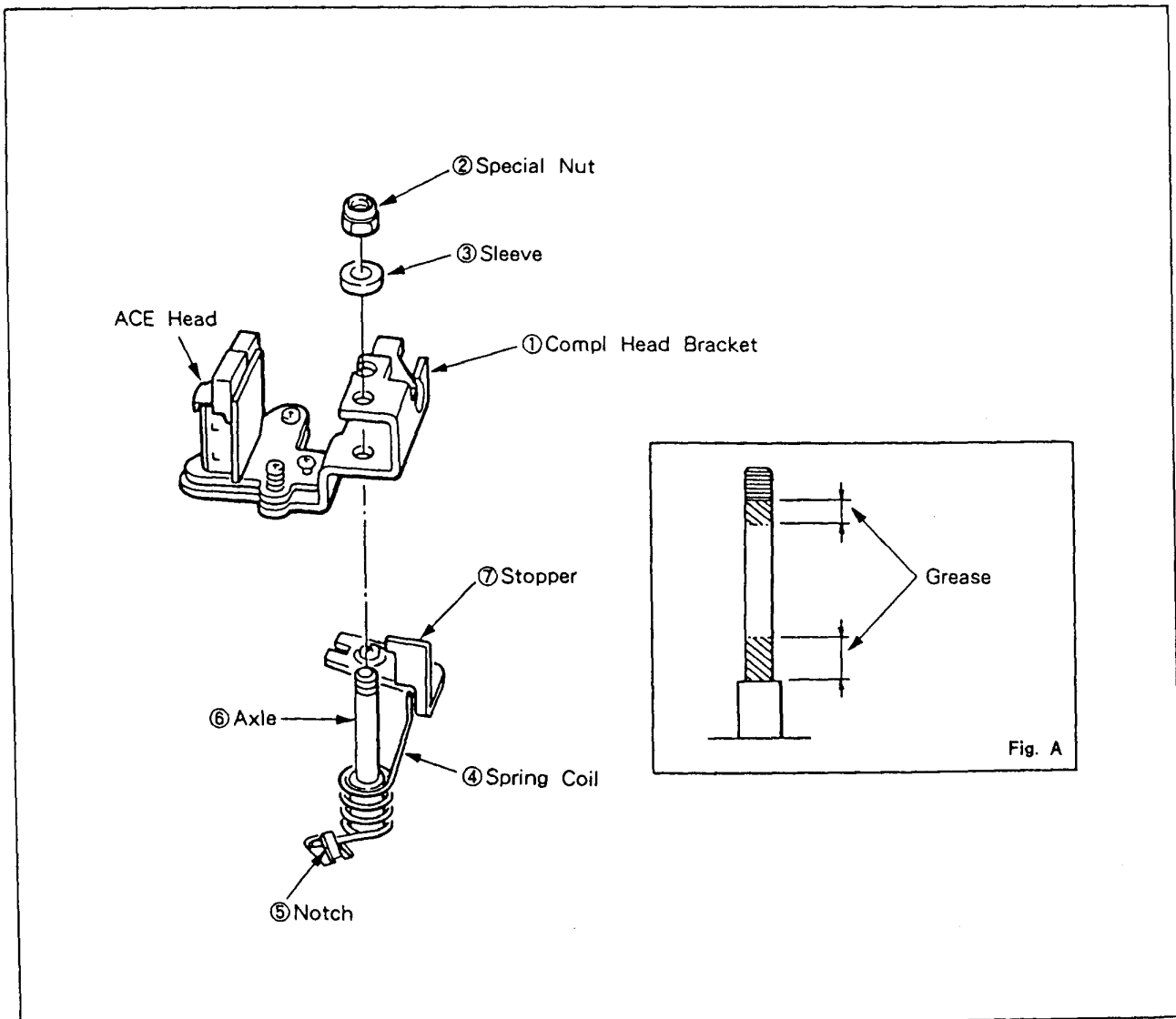


Fig. 5-5-1. Compl Head Bracket (ACE Head)

## 5-6. PINCH ROLLER PRESSURE MECHANISM (See Fig. 5-6-1.)

### 1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the COMPL HEAD BRACKET as instructed in 5-5.
- 3) Remove the PINCH SPRING COIL ①.
- 4) Remove the special washer ②, then remove the PINCH LEVER ASS'Y ③.
- 5) Remove the REV GUIDE LEVER SPRING COIL ④.
- 6) Remove REV GUIDE LEVER ASS'Y ⑥ from the hook ⑤ of the plastic bearing on the bottom side. Use a jig VHJ-0073 shown in Fig. 5-6-2 to widen the hook of the plastic bearing. By so doing, the above removal of the REV GUIDE LEVER ASS'Y ⑥ can be made more easily. Care should be taken to avoid pushing the jig VHJ-0073 too much. Pushing it too hard may damage the hook in an extreme case.
- 7) Remove the SLIDE BRAKE SPRING COIL ⑦.
- 8) Remove the special washer ⑧, then remove the PINCH CAM LEVER ASS'Y ⑨.
- 9) Remove the ACT PINCH SLIDE ASS'Y ⑩.

**Note:** If the hook ⑤ of the plastic bearing is damaged, reference should be made to Section 3. "Method of Repairing the Bearing Section of REV GUIDE LEVER ASS'Y".

### 2. Remounting

- 1) Apply grease to pins ⑫/⑬ and axles ⑮/⑯.
- 2) Apply grease to the ACT PINCH SLIDE ASS'Y pin ⑰.
- 3) Set the INITIAL mode with the mode selector (VHJ-0050).
- 4) Mount the ACT PINCH SLIDE ASS'Y ⑩ onto pins ⑫ and ⑬.
- 5) Insert the pin ⑭ of the PINCH CAM LEVER ASS'Y ⑨ into the MAIN CAM ⑪ GROOVE 1, and mount onto the axle ⑮ while inserting the ACT PINCH SLIDE ASS'Y pin ⑰ of the ACT PINCH SLIDE ASS'Y into the hole ⑮.
- 6) Mount the special washer ⑧ onto the axle ⑮.
- 7) Hook the SLIDE BRAKE SPRING COIL ⑦ to the plastic pin ⑱.
- 8) Mount the REV GUIDE LEVER ASS'Y ⑥ to the plastic molding bearing, then fix it with the hook ⑤ at the bottom.
- 9) Hook the REV GUIDE LEVER SPRING COIL ④.
- 10) Mount the PINCH LEVER ASS'Y ③ to the axle ⑮.
- 11) Mount the special washer ② to the axle ⑮.
- 12) Hook the PINCH SPRING COIL ① between the ACT PINCH SLIDE ASS'Y ⑩ and the PINCH LEVER ASS'Y ③.
- 13) Mount the COMPL HEAD BRACKET as instructed in 5-5.
- 14) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 15) Perform ACE head adjustment as instructed in 6-4.

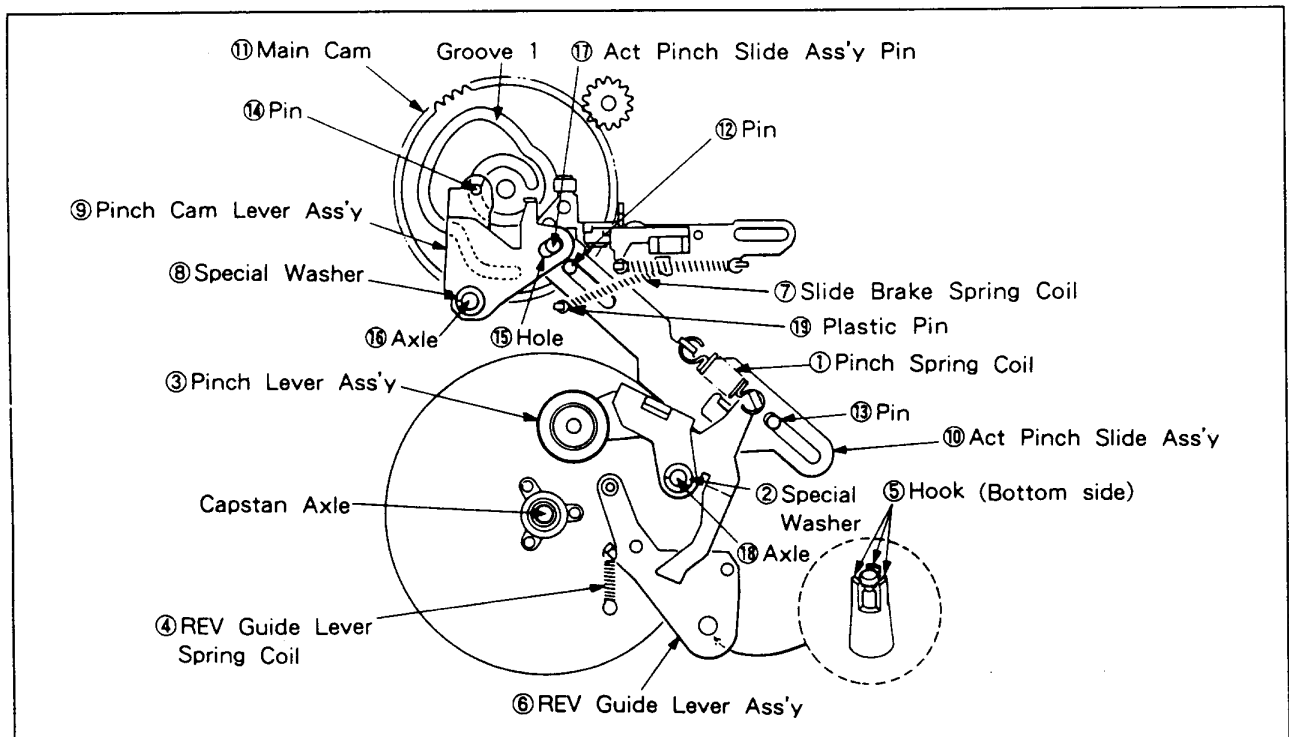


Fig. 5-6-1. Pinch Roller Pressure Mechanism

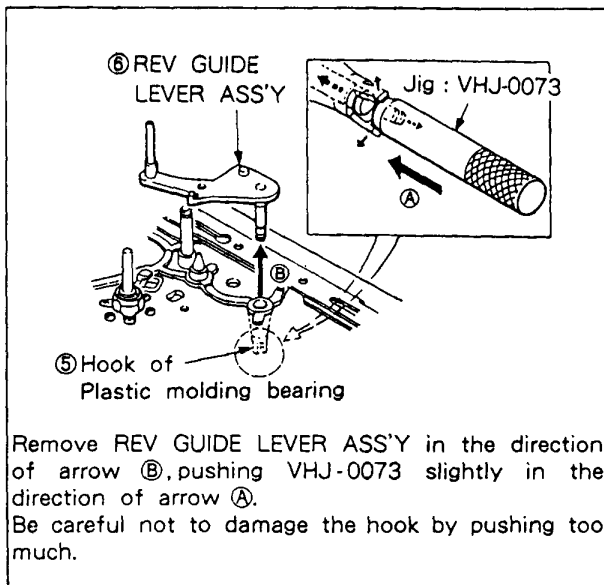


Fig. 5-6-2 Method of Using the Jig VJH-0073

### 3. Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY

If the hook of the plastic molding bearing is damaged in the process of removing the REV GUIDE LEVER ASS'Y, proceed with the repair as follows:

- 1) Scrape the broken hook of the bearing section with a cutter knife and flatten it.
- 2) Insert the REV GUIDE LEVER ASS'Y in the bearing and fit a stopper washer in. The special washer to be used must be Part No. 411 109 1605. This stop washer (Part No. 411 109 1605) is the same as that used on SUPPLY REEL ASS'Y or TAKE-UP REEL ASS'Y.

Remove the REV GUIDE LEVER ASSEMBLY toward an arrow B while pushing the jig VJH-0073 lightly in the direction of an arrow.

Pushing the jig VJH-0073 too much may cause hook breakage. Therefore, care should be taken.

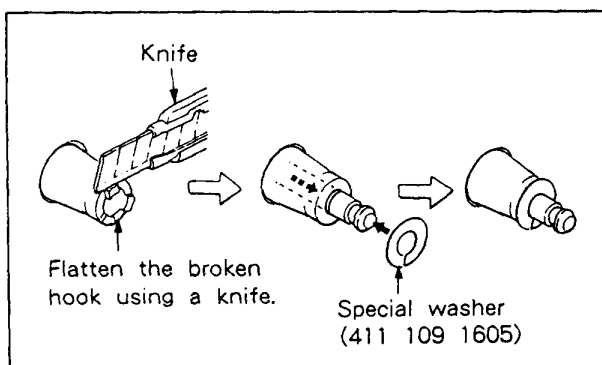


Fig. 5-6-3 Method of Repairing the Bearing Section of the REV GUIDE LEVER ASSEMBLY

## 5-7. BRAKE MECHANISM

### 5-7-1. Sub Take-up Brake Ass'y (See Fig. 5-7-1.)

#### 1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the SPRING COIL ①.
- 3) While pushing the hook ② in the direction of arrow, remove the SUB TAKE-UP BRAKE ASS'Y ③.

#### 2. Remounting

- 1) Mount the SUB TAKE-UP BRAKE ASS'Y ③ onto the pin ④. Confirm that the hook ② is firmly hooked to the chassis.
- 2) Fit the SPRING COIL between hooks ⑤ and ⑥.
- 3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

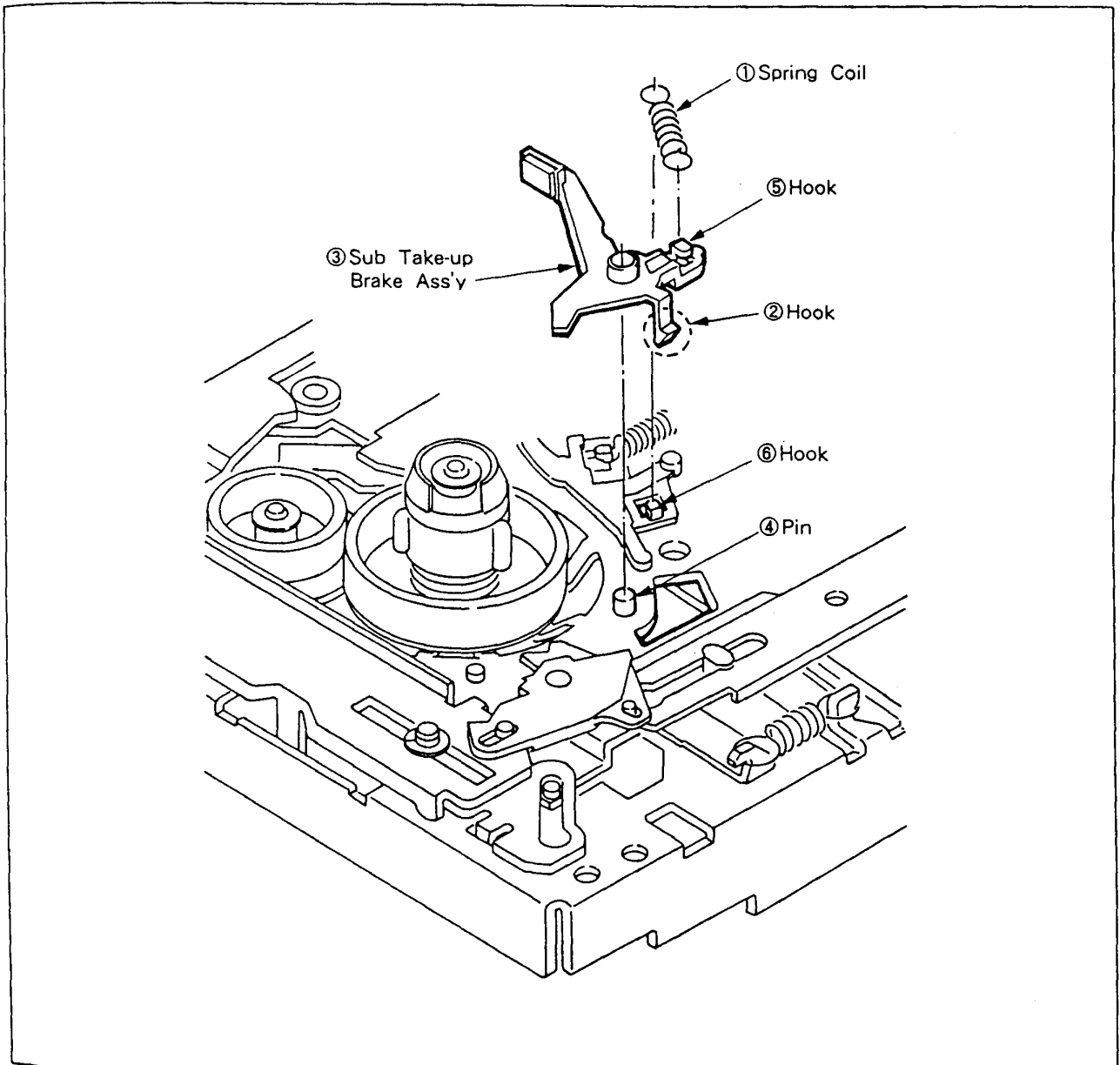


Fig. 5-7-1. Sub Take-up Brake Ass'y



**5-7-2. Supply Brake Ass'y and Take-up Brake Ass'y**  
(See Fig. 5-7-2.)

**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the SUB TAKE-UP BRAKE as instructed in 5-7-1.
- 3) Remove the special washer ①, then remove the CONTROL PLATE LEVER ②.
- 4) Remove the two special washers ③, then remove the M PLATE SLIDE ASS'Y ④.
- 5) Remove the SPRING COIL ⑤.
- 6) Remove the SUPPLY BRAKE ASS'Y ⑥ and the TAKE-UP BRAKE ASS'Y ⑦.

**Note:** Take care not to soil the brake shoes.

**2. Remounting**

- 1) Apply a thin layer of grease to axles ⑧ and ⑨.
- 2) Mount the TAKE-UP BRAKE ASS'Y ⑦ onto the axle ⑧.
- 3) Mount the SUPPLY BRAKE ASS'Y ⑥ onto the axle ⑨.
- 4) After applying a thin layer of grease to the M PLATE SLIDE ASS'Y ④ as shown in Fig. A, mount it onto the two pins ⑩.
- 5) Mount the two special washers ③ onto the two pins ⑩.
- 6) After applying grease to the CONTROL PLATE LEVER ② as shown in Fig. B, mount it onto the axle ⑪. Insert the ACT PLATE SLIDE ASS'Y pin ⑫ into the hole ⑭, and the M PLATE SLIDE ASS'Y pin ⑬ into the hole ⑮.
- 7) Mount the special washer ① onto the pin ⑫.
- 8) Mount the SUB TAKE-UP BRAKE as instructed in 5-7-1.
- 9) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

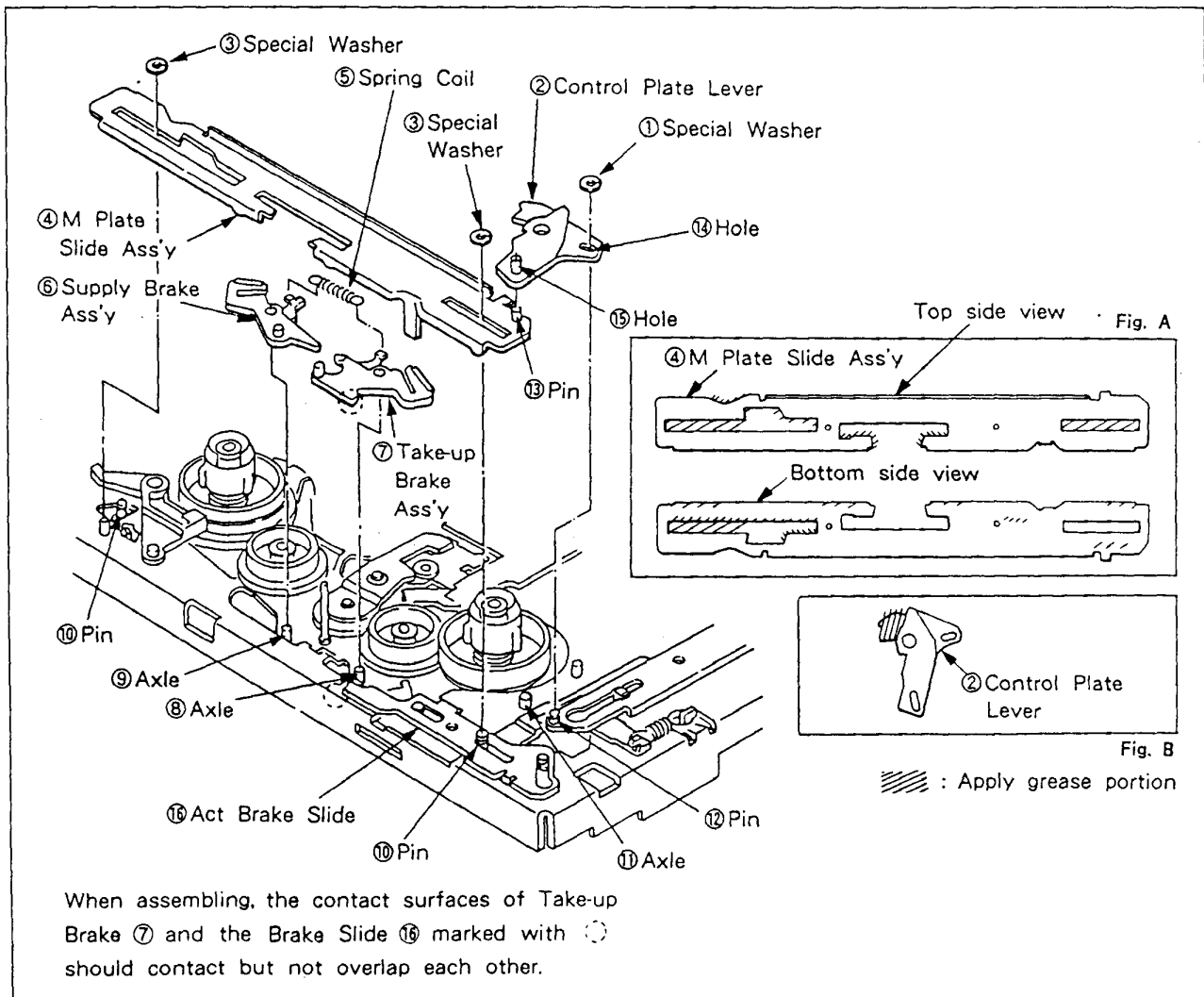


Fig. 5-7-2. Supply Brake Ass'y & Take-up Brake Ass'y



**5-7-3. Tension Lever Ass'y and Band Holder Ass'y**  
(See Fig. 5-7-3.)

**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the SPRING COIL ①.
- 3) Remove the screw ③ fixing the BAND HOLDER ASS'Y ②.
- 4) Push the SUB SUPPLY BRAKE ④ in the direction of the arrow A, setting the BAND HOLDER ASS'Y ② free.
- 5) Open the hook ⑤ a little and remove the TENSION LEVER ASS'Y ⑥. Take care not to open the hook ⑤ too much, otherwise it may be deformed or broken.
- 6) Remove the hook ⑦ of the BAND HOLDER ASS'Y.

**2. Remounting**

- 1) Mount the BAND HOLDER ASS'Y hook ⑦ into the TENSION LEVER ASS'Y hole ⑧.
- 2) Insert the TENSION LEVER ASS'Y axle ⑨ into the hole ⑩ and confirm that the hook ⑤ is hooked.
- 3) While pushing the SUB SUPPLY BRAKE ④ in the direction of arrow A, mount the BAND HOLDER ASS'Y ② with the screw ③.
- 4) Hook the SPRING COIL ① between the hooks ① and ⑫.
- 5) Perform TENSION POLE position adjustment as instructed in 6-3.
- 6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

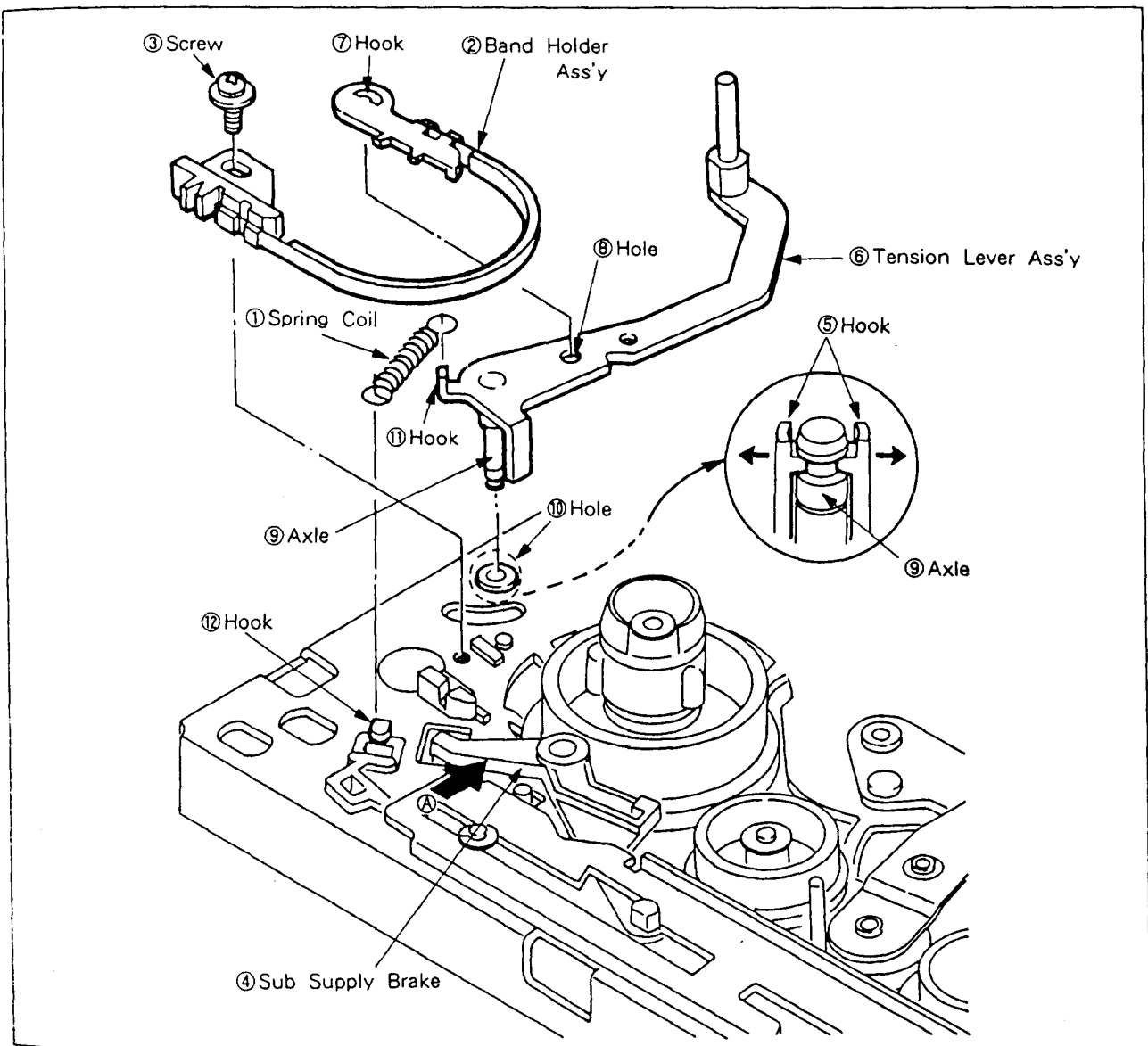


Fig. 5-7-3. Tension Lever Ass'y & Band Holder Ass'y

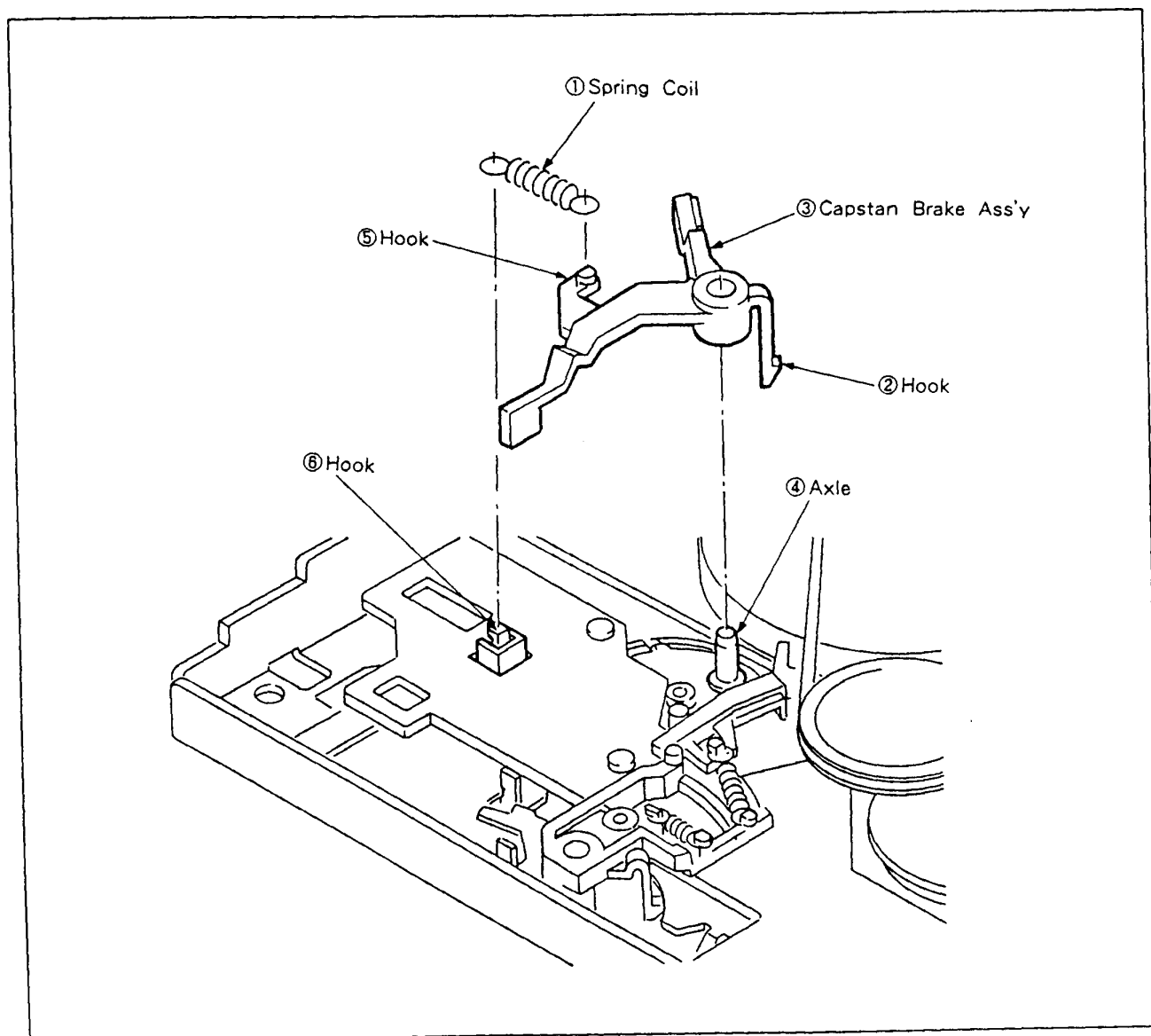
**5-7-4. Capstan Brake Ass'y (See Fig. 5-7-4.)**

**1. Removal**

- 1) Remove the SPRING COIL ①.
- 2) Unhook the hook ②, then remove the CAPSTAN BRAKE ASS'Y ③.

**2. Remounting**

- 1) Mount the CAPSTAN BRAKE ASS'Y ③ onto the axle ④. Confirm that the hook ② is hooked to the chassis.
- 2) Hook the SPRING COIL ① between hooks ⑤ and ⑥. Fix the hook ⑥ side with adhesive (use an adhesive that allows later detaching).



**Fig. 5-7-4. Capstan Brake Ass'y**

## 5.8. REEL TABLE DRIVE MECHANISM

### 5-8-1. Supply Reel Ass'y and Supply Reel Gear (See Fig. 5-8-1.)

#### 1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the BAND HOLDER ASS'Y as instructed in 5-7-3.
- 3) Set the PLAY mode with the mode selector (VHJ-0050).
- 4) Remove the special washer ①, then remove the SUPPLY REEL ASS'Y ② and the washer ③.
- 5) Remove the special washer ④.
- 6) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, remove the SUPPLY REEL GEAR ⑥ and the washer ⑦.

**Note:** Be sure that no dirt gets on the section where both brake shoes make contact.

#### 2. Remounting

- 1) Apply a little oil (less than one drop) to the part of the axle ⑧ indicated by the arrow B, then mount the washer ⑦.
- 2) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, mount the SUPPLY REEL GEAR ⑥ onto the axle ⑧.
- 3) Mount the special washer ④ to the axle ⑧.
- 4) Apply 1 drop of oil to the part of the axle ⑨ indicated by the arrow C, then mount the washer ③.
- 5) Mount the SUPPLY REEL ASS'Y ② onto the axle ⑨.
- 6) Perform reel table height adjustment as instructed in 6-2-1.
- 7) Mount the special washer ① onto the axle ⑨.
- 8) Mount the BAND HOLDER ASS'Y as instructed in 5-7-3.
- 9) Perform tension pole position adjustment as instructed in 6-3.
- 10) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

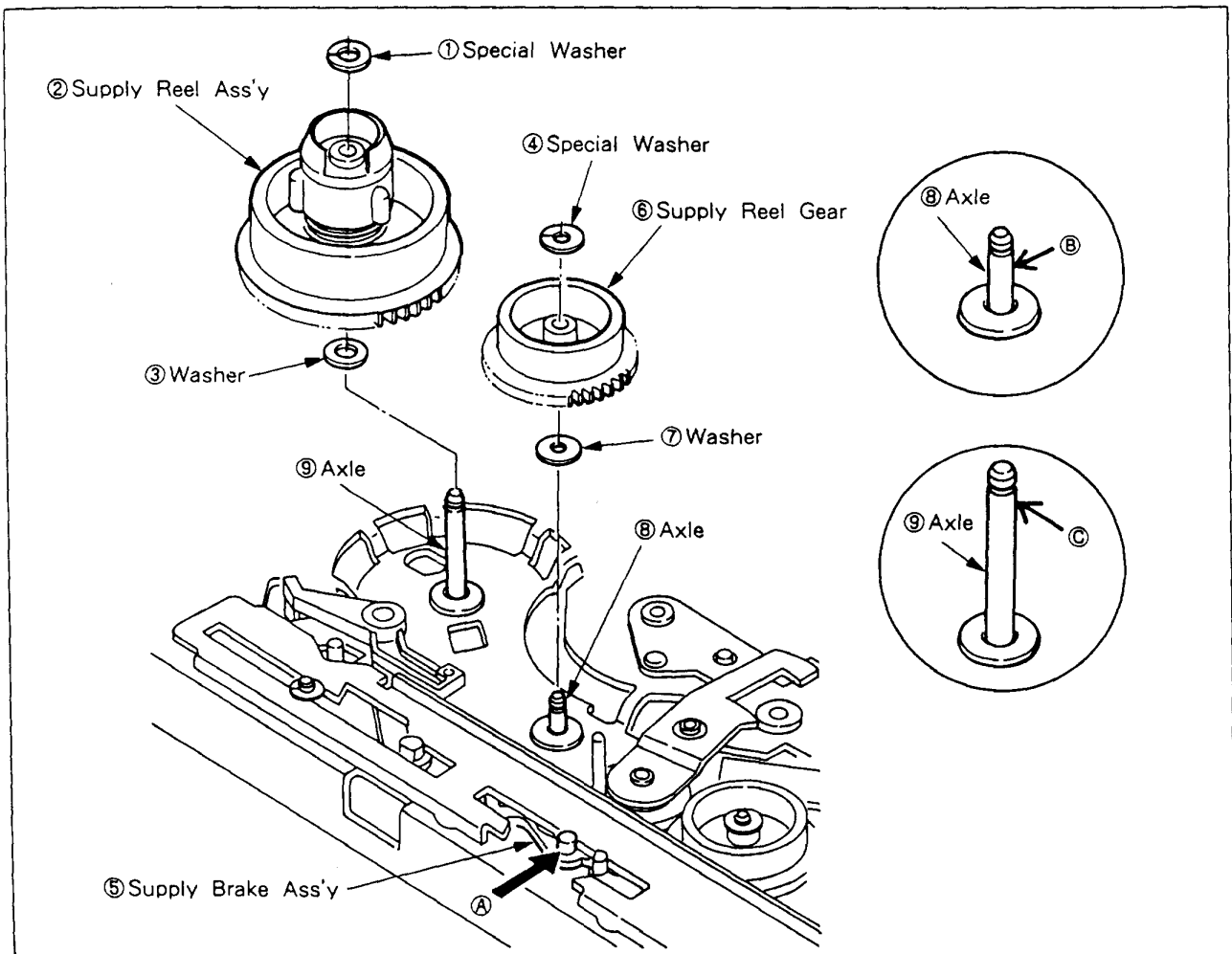


Fig. 5-8-1. Supply Reel Ass'y & Supply Reel Gear

5-8-2. Take-up Reel Ass'y (See Fig. 5-8-2.)

1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the special washer ①.
- 3) Push the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A to release the brake, then remove the TAKE-UP REEL ASS'Y ③ and the washer ④.

Note: Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

- 1) Apply 1 drop of oil to the part of the axle ⑤ indicated by the arrow B, then mount the washer ④.
- 2) While pushing the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A, mount the TAKE-UP REEL ASS'Y ③ onto the axle ⑤.
- 3) Perform reel table height adjustment as instructed in 6-2.
- 4) Mount the special washer ① onto the axle ⑤.
- 5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

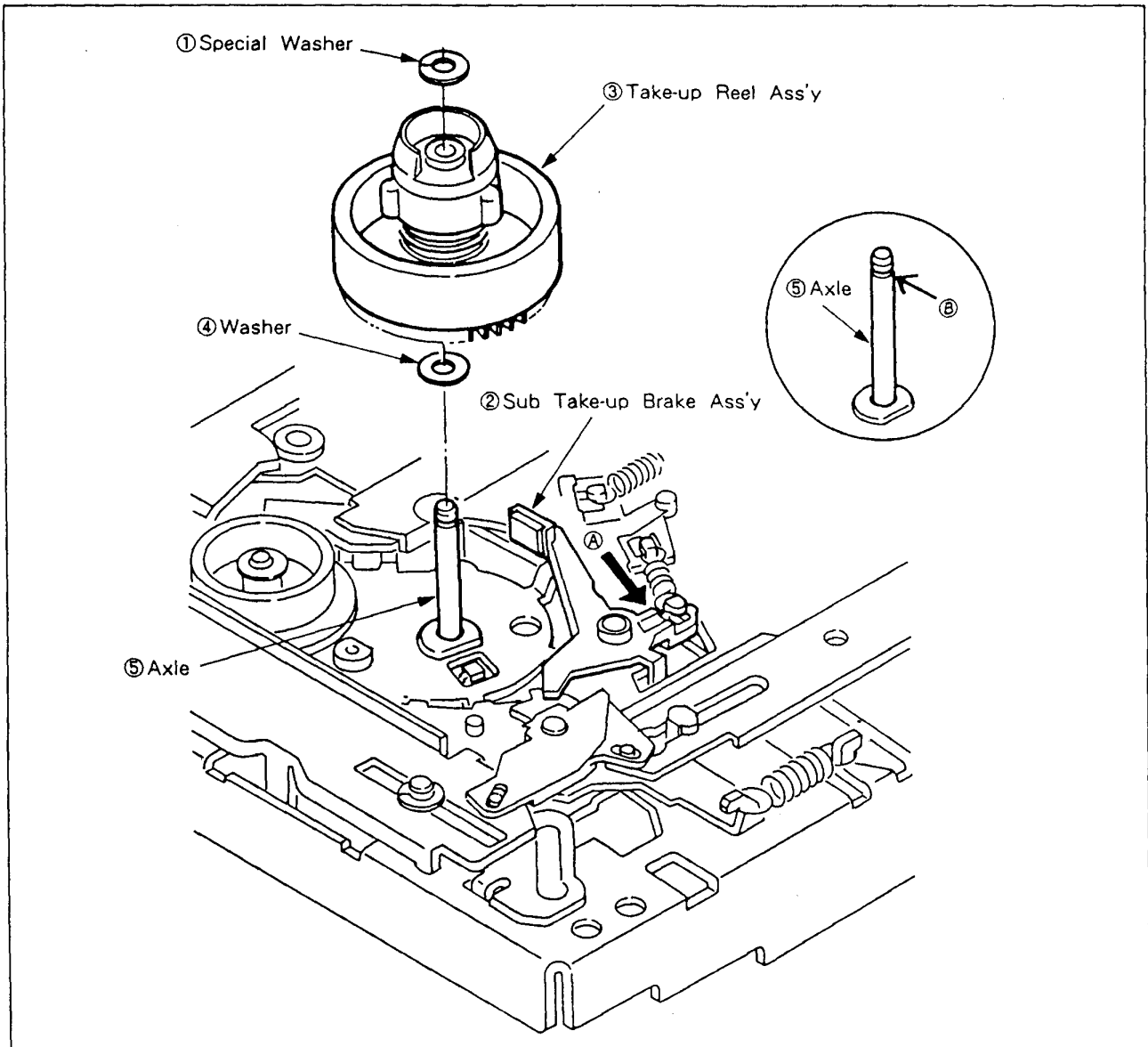


Fig. 5-8-2. Take-up Reel Ass'y

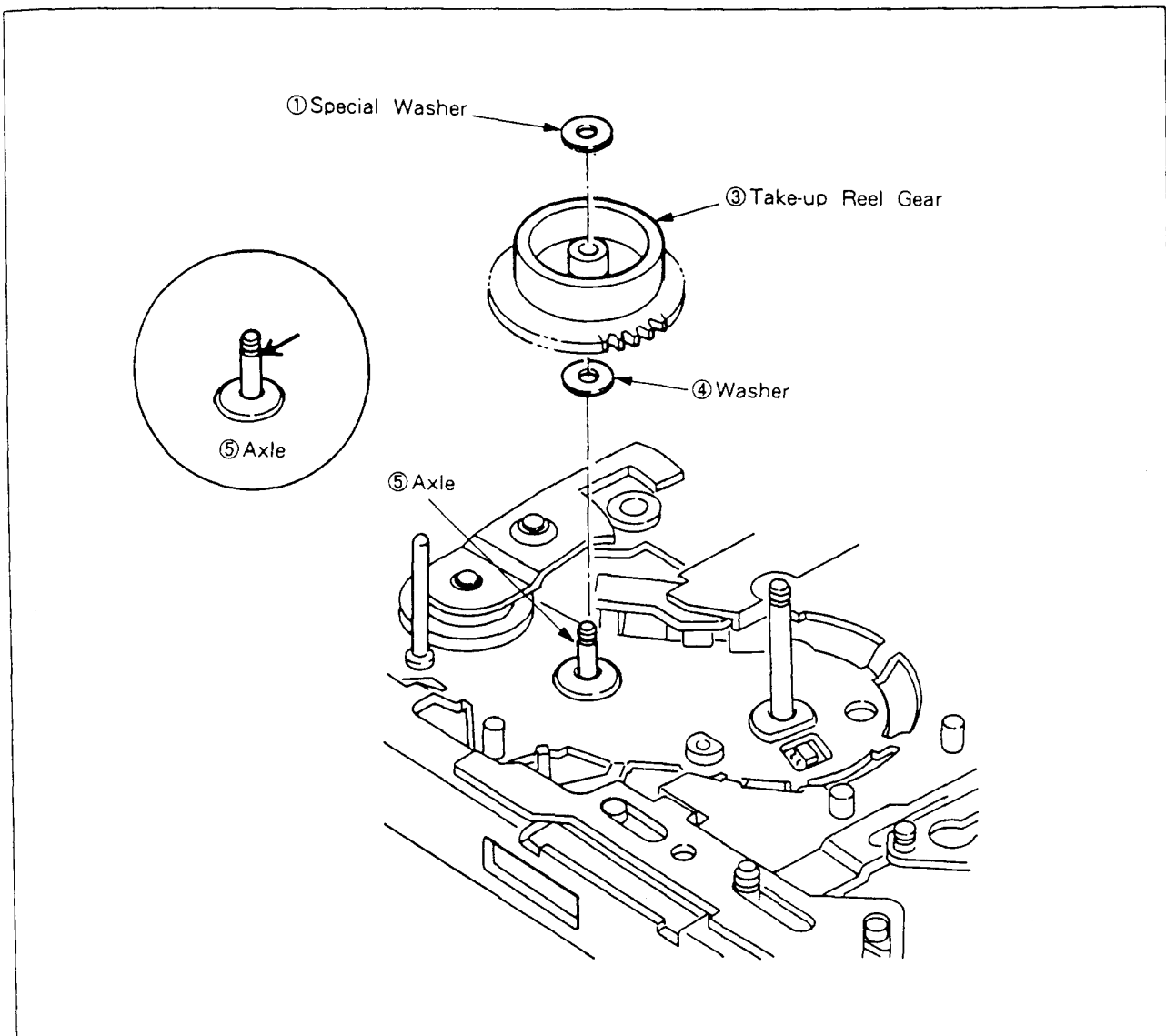
**5-8-3. Take-up Reel Gear (See Fig. 5-8-3.)**

**1. Removal**

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
- 3) Remove the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
- 4) Remove the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
- 5) Remove the special washer ①, then remove the TAKE-UP REEL GEAR ③ and the washer ④.

**2. Remounting**

- 1) Apply a little oil (less than one drop) to the part of the axle ⑤ indicated with an arrow.
- 2) Mount the washer ④ and the TAKE-UP REEL GEAR ③ onto the axle ⑤.
- 3) Mount the special washer ① onto the axle ⑤.
- 4) Mount the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
- 5) Mount the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
- 6) Mount the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
- 7) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.



**Fig. 5-8-3. Take-up Reel Gear**

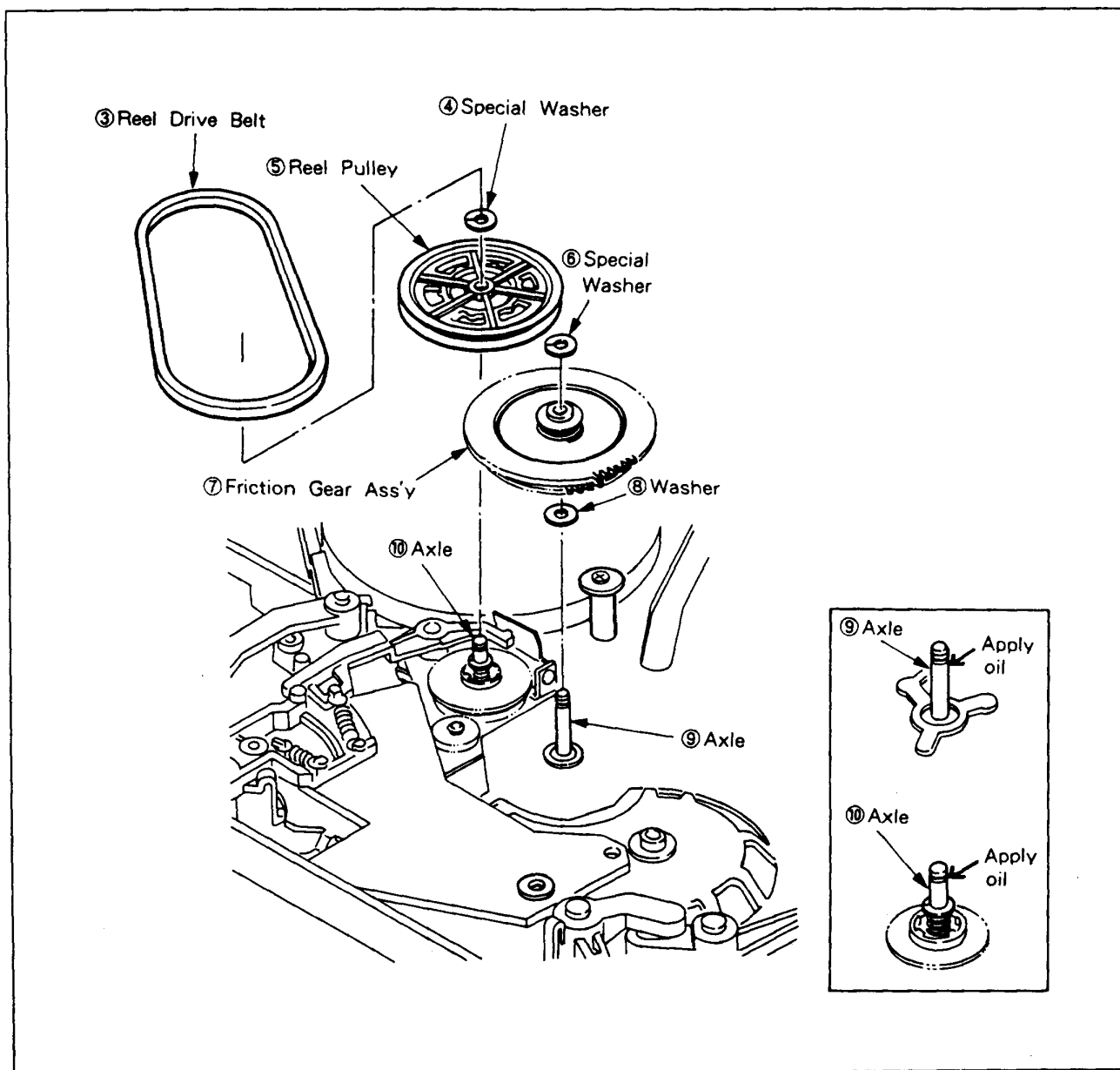
**5-8-4. Reel Pulley and Friction Gear Ass'y (See Fig. 5-8-4.)**

**1. Removal**

- 1) Remove the REEL DRIVE BELT ③.
- 2) Remove the special washer ④, then remove the REEL PULLEY ⑤.
- 3) Remove the special washer ⑥, then remove the FRICTION GEAR ASS'Y ⑦ and the washer ⑧.

**2. Remounting**

- 1) Apply one drop of oil to the parts of axles ⑨ and ⑩ indicated with arrows.
- 2) Mount the washer ⑧ and the FRICTION GEAR ASS'Y ⑦ onto the axle ⑨.
- 3) Mount the special washer ⑥ onto the axle ⑨.
- 4) Mount the REEL PULLEY ⑤ onto the axle ⑩.
- 5) Mount the special washer ④ onto the axle ⑩.
- 6) Set the REEL DRIVE BELT ③.



**Fig. 5-8-4. Reel Pulley & Friction Gear**

### 5-8-5. COMPL Clutch (See Fig. 5-8-5.)

#### 1. Removal

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
- 2) Remove the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
- 3) Remove the screw ①, then remove the COMPL MC-4 ②.
- 4) Remove the two screws ③, then remove the COMPL CLUTCH ④.

#### 2. Remounting

- 1) Mount the COMPL CLUTCH ④ with the two screws ③, aligning it with the protuberance ⑤.
- 2) After inserting the CN831 (COMPL MC-4) into the CN801 (COMPL MC-1), mount the COMPL MC-4 with the screw ①.
- 3) Mount the REEL PULLEY and REEL DRIVE BELT as instructed in 5-8-4.
- 4) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

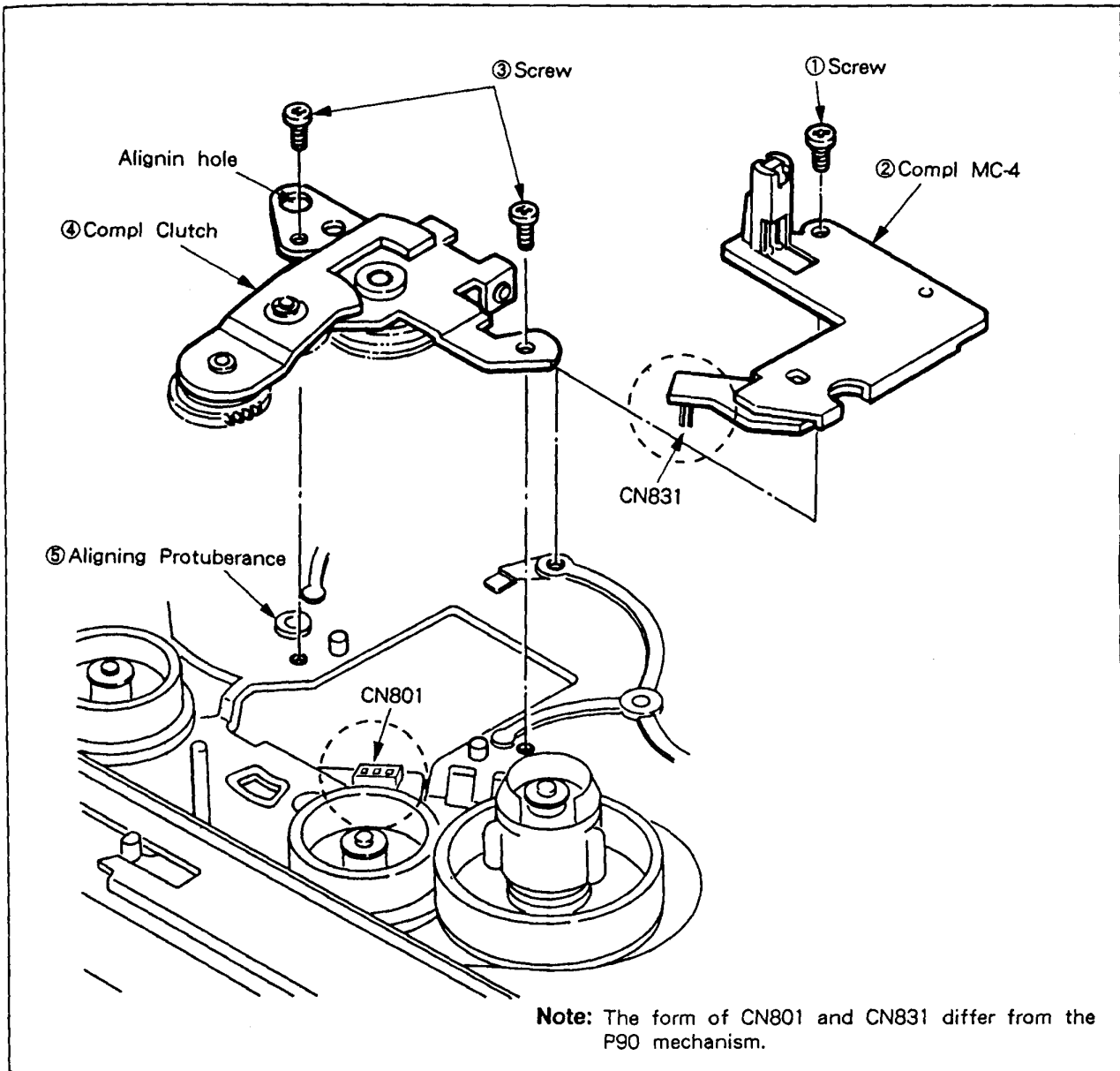


Fig. 5-8-5. Compl Clutch

**5-8-6. Clutch Change Lever and Clutch Lever Ass'y**  
(See Fig. 5-8-6.)

**1. Removal**

- 1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
- 2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
- 3) Remove the SPRING COIL ①.
- 4) Unhook the hook ②, then remove the CLUTCH CHANGE LEVER ③.
- 5) Unhook the hook ⑤, then remove the CLUTCH LEVER ASS'Y ⑥.

**2. Remounting**

- 1) Mount the CLUTCH LEVER ASS'Y ⑥ onto the axle ⑦. Confirm that the hook ⑤ is hooked to the chassis.
- 2) Mount the CLUTCH CHANGE LEVER ③ onto the axle ⑧. Confirm that the hook ② is hooked to the chassis.
- 3) Hook the SPRING COIL ① between the hooks ⑨ and ⑩.
- 4) Mount the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
- 5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

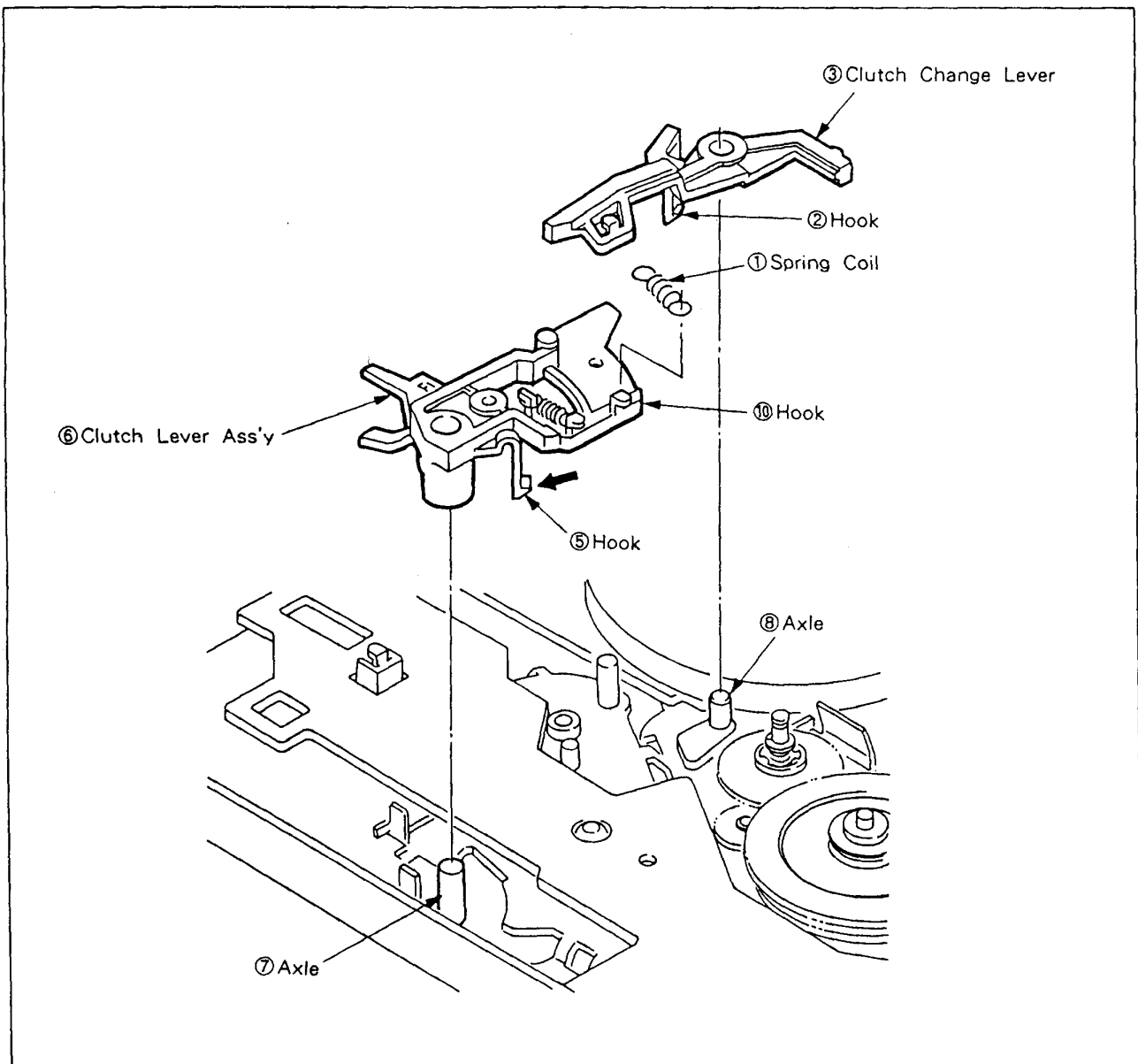


Fig. 5-8-6. Clutch Change Lever & Clutch Lever Ass'y



## 5.9. CAPSTAN MOTOR (See Fig. 5-9-1.)

### 1. Removal

- 1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
- 2) Remove the CAPSTAN MOTOR ⑥ connector.
- 3) Remove the REEL DRIVE BELT ② from the CAPSTAN MOTOR PULLEY ①.
- 4) Remove the two screws ④ fixing the COMPL CASSETTE MECHANISM TOP BOARD ③, then slide the TOP BOARD ③ backward.
- 5) Remove the three screws ⑤, then remove the CAPSTAN MOTOR ⑥.

**Note :** Take care not to scratch or soil the capstan axle.

### 2. Remounting

- 1) Mount the CAPSTAN MOTOR ⑥ with the three screws ⑤.
- 2) Connect the CAPSTAN MOTOR ⑥ connector.
- 3) Mount the TOP BOARD ③ with the two screws ④.
- 4) Fit the REEL DRIVE BELT ② around the CAPSTAN MOTOR PULLEY ① and the REEL PULLEY ⑦.
- 5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

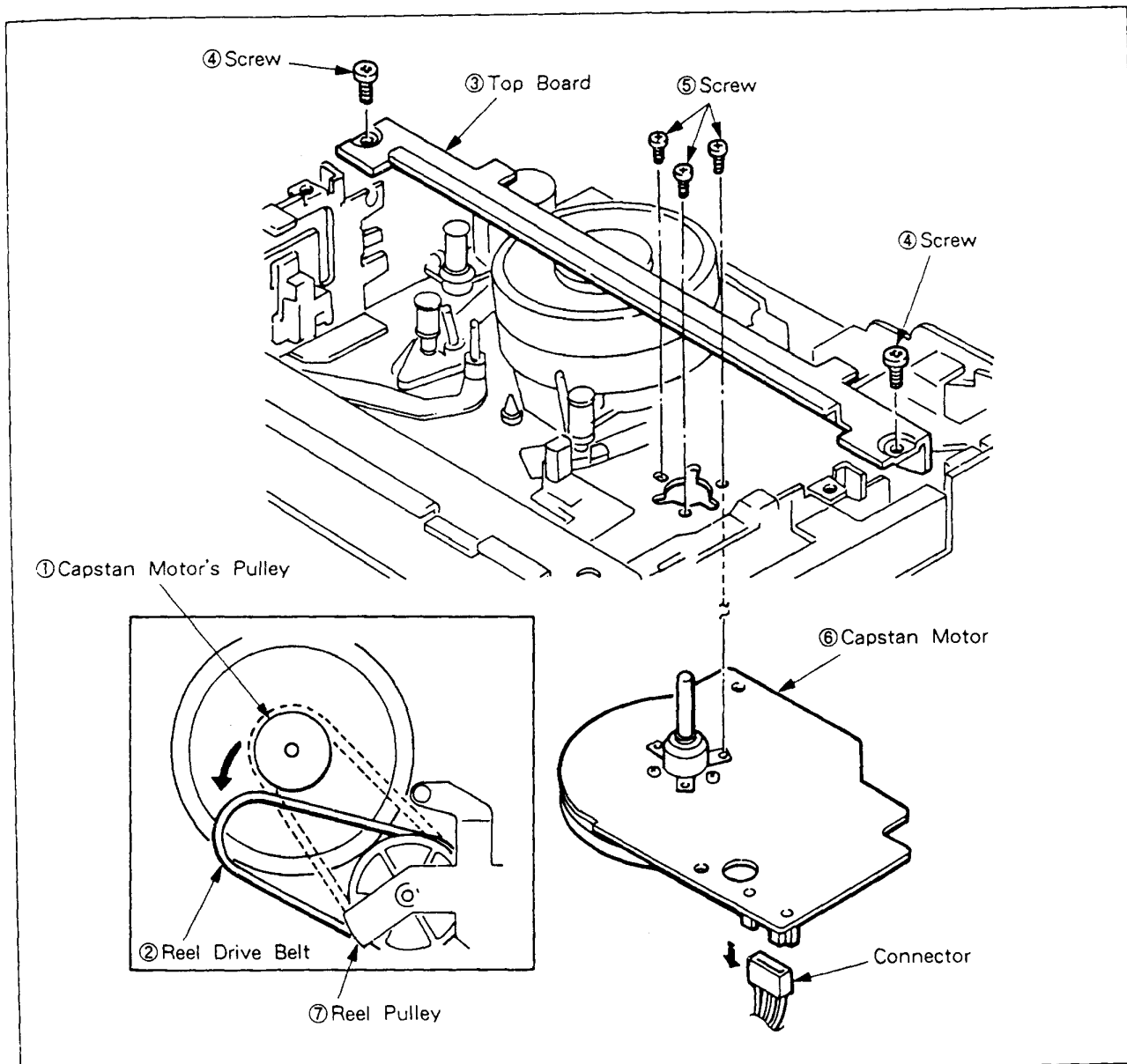


Fig. 5-9-1. Capstan Motor

## 5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

(The IMPEDANCE ROLLER is  
not used on this model)

### 5-10-1. S-Side Fixed Guide and FE Lever Ass'y (See Fig. 5-10-1.)

#### 1. Removal

- 1) Remove the special nut ①, then remove the GUIDE PIPE ③ and the special washer ② (lower), in that order.
- 2) Remove the SPRING COIL ⑤.
- 3) Remove the FTE HEAD connector, then remove the FE HEAD LEVER ASS'Y ⑦.

#### 2. Remounting

- 1) Mount the FE LEVER ASS'Y ⑦ onto the axle ⑧.
- 2) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE LEVER ASS'Y hook ⑩.
- 3) Mount the special washer ② (lower), the GUIDE PIPE ③ and the special nut ① to the axle ⑧, in that order. At that time, do not excessively tighten the special nut ① to avoid idle rotation of the axle rivet. The height of fixing guide on the inlet side is not required.
- 4) Connect the connector to the FTE HEAD.

**Note:** Some models do not have the impedance roller.

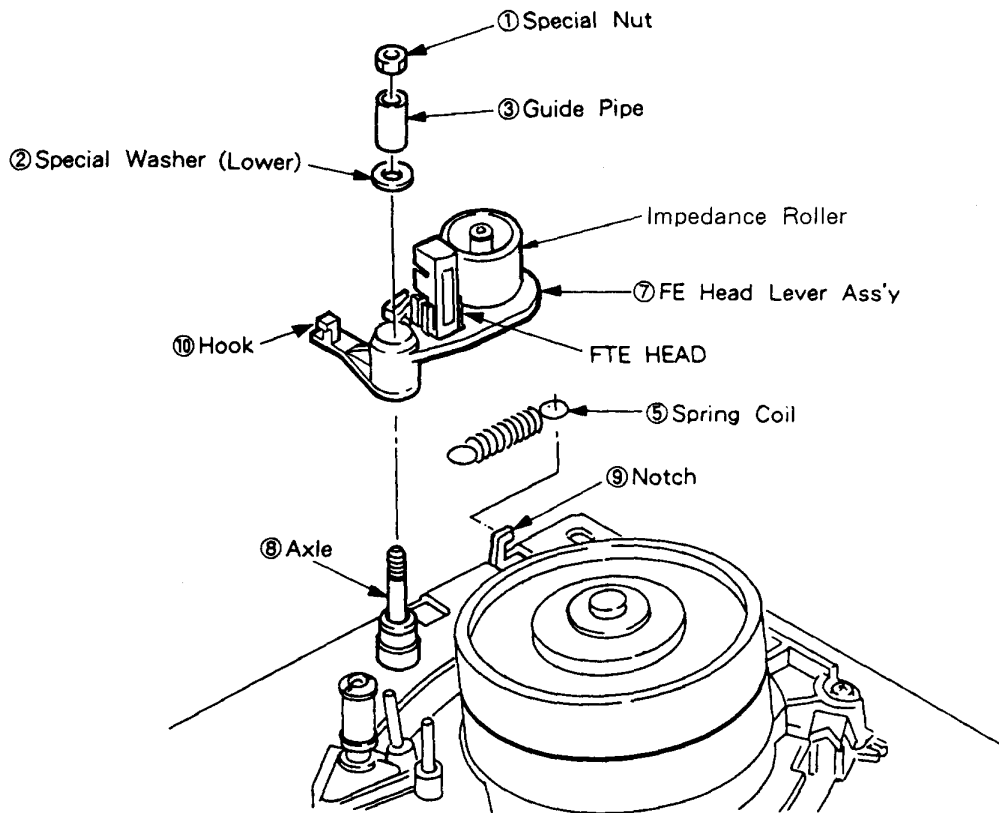


Fig. 5-10-1. Fixed Guide (S) & FE Lever Ass'y

**5-10-2. Impedance Rolly, FTE Head (See Fig. 5-10-2.)**

(The IMPEDANCE ROLLER is  
not used on this model)

**1. Removal**

- 1) Remove the FTE HEAD (full track erase head) ① connector.
- 2) Remove the special washer ②, then remove the IMPEDANCE ROLLER ③ and the washer ④.
- 3) Open the hook ⑤ a little and remove the FTE HEAD ①.

**Note:** Take care not to open the hook too much, otherwise it may be deformed or broken.

**2. Remounting**

- 1) Mount the FTE HEAD ① onto the FE HEAD LEVER ASS'Y ⑥. Confirm that the hook ⑤ is hooked to the FTE HEAD ①.
- 2) Mount the washer ④ and the IMPEDANCE ROLLER ③, in that order, onto the axle ⑦, then mount the special washer ②.
- 3) Connect the connector to the terminal of the FTE HEAD ①.

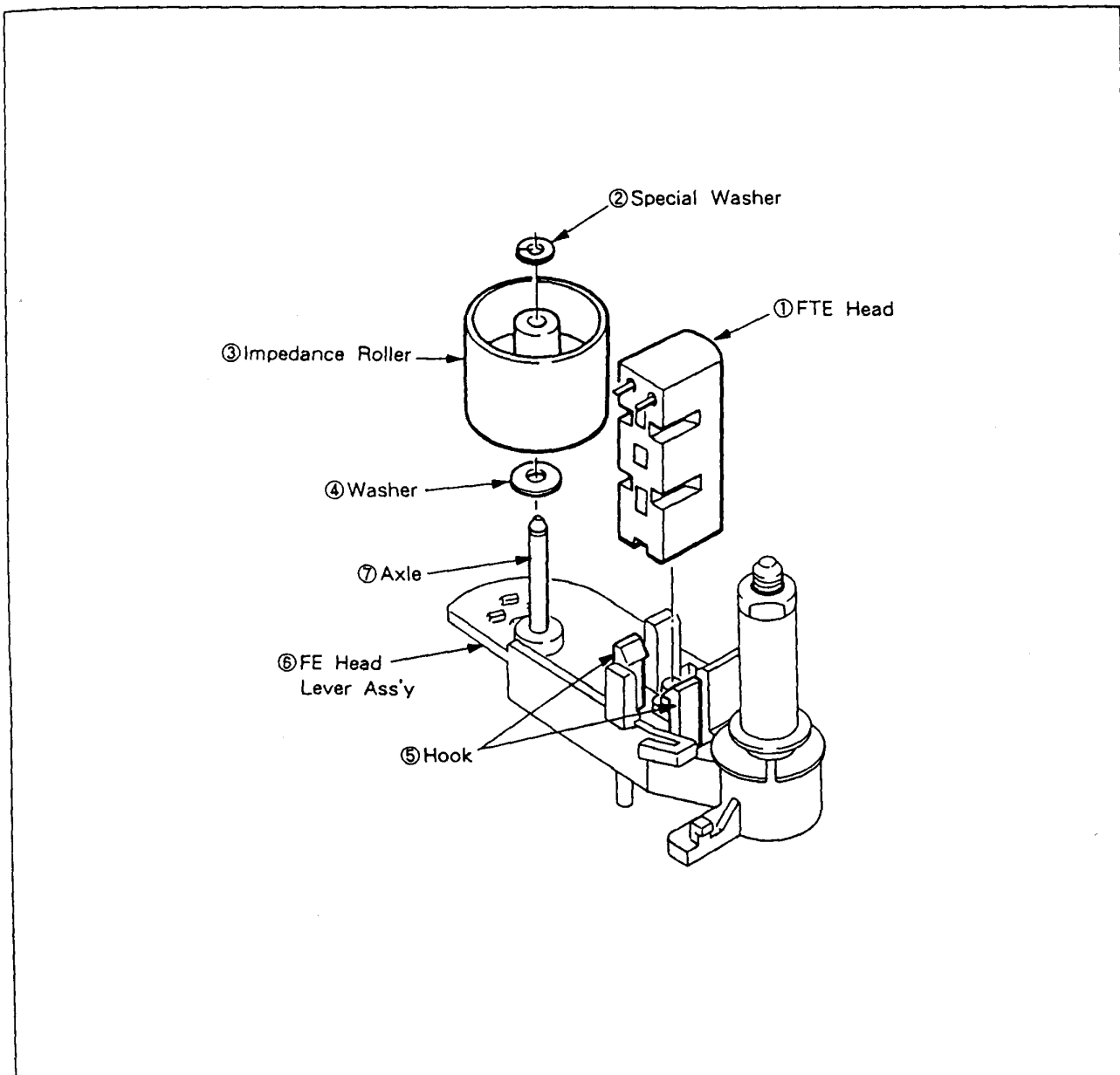


Fig. 5-10-2. Impedance Roller & FTE Head

### 5-10-3. Exit side Fixed Guide (See Fig. 5-10-3.)

#### 1. Removal

- 1) Remove the CAP ①.
- 2) Remove the special NUT ②, then remove the special washer ③ (upper), the GUIDE PIPE ④, the special washer ③ (lower) and the sleeve ⑤, in that order.

#### 2. Remounting

- 1) Mount the sleeve ⑤, the special washer ③ (lower), the GUIDE PIPE ④, the special washer ③ (upper) and the special NUT ②, in that order, to the axle ⑥.
- 2) Mount the CAP ① onto the axle ⑥.

**Note:** There is no need of height adjustment of the exit side fixed guide.

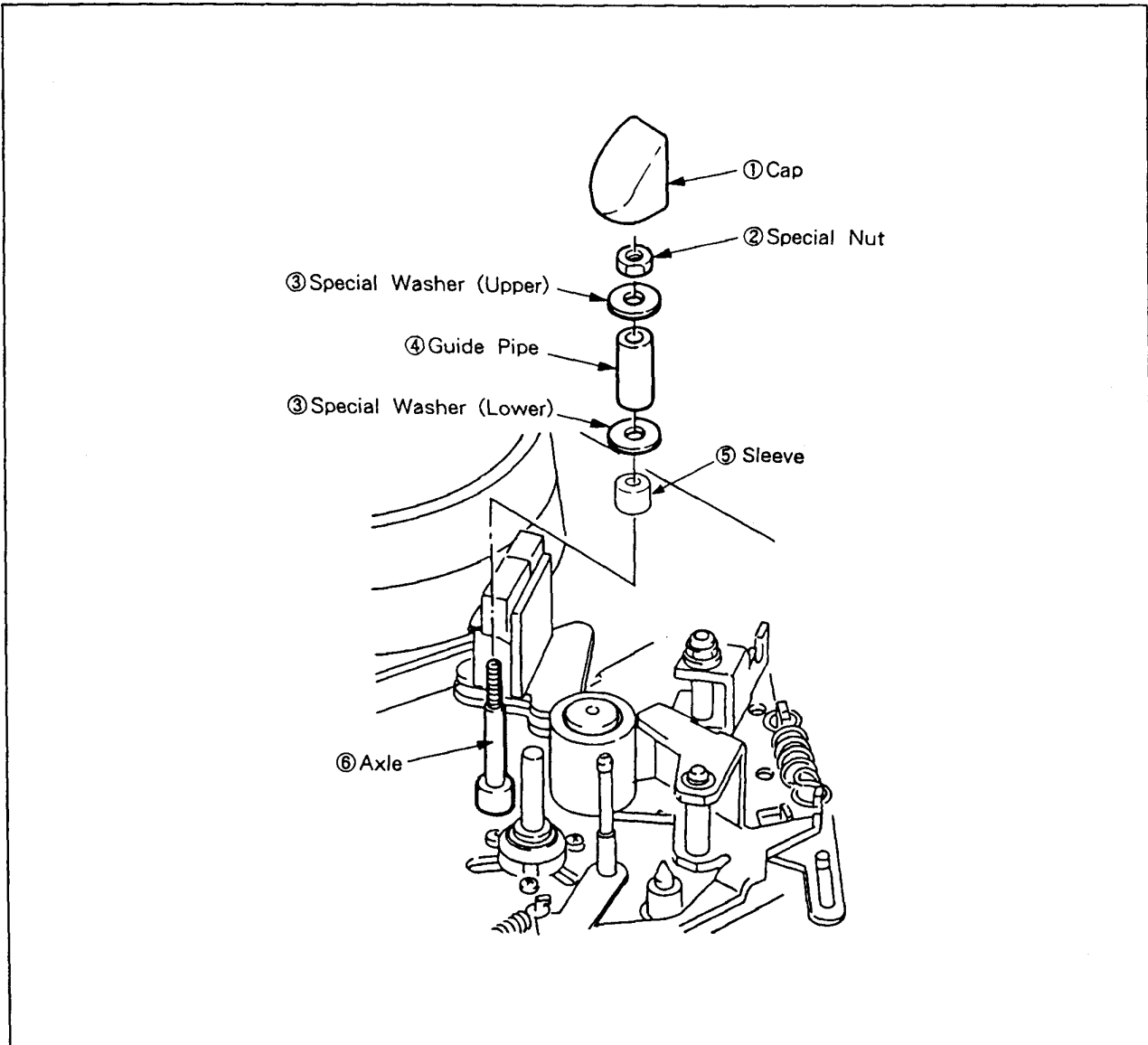


Fig. 5-10-3. Fixed Guide (T)

## 5-11. DRUM SECTION

### 5-11-1. Drum Motor (rotor, stator) (See Fig. 5-11-1.)

#### 1. Removal

- 1) Referring to 5-4-1, remove the special washer and the LOAD RACK.
- 2) Remove the screw ①, then remove the CYLINDER EARTH ASS'Y ②.
- 3) Remove the two screws ③, then remove the ROTOR ④ and SPACER.
- 4) Remove the STATOR board connector ⑩.
- 5) Remove the three screws ⑤, then remove the STATOR ⑥.

#### 2. Remounting

- 1) Mount the STATOR ⑥ with the three screws ⑤.
- 2) Mount the SPACER ⑪ on to the AXLE ⑫.
- 3) While aligning the ROTOR oval hole ⑦ with the ROTOR DISK hole ⑧, mount the ROTOR with the two screws ③.

- 4) Insert the connector ⑩.
- 5) While aligning the CYLINDER EARTH ASS'Y ② protuberance with the chassis hole ⑨, mount it with the screw ①.
- 6) Referring to 5-4-1 attach the LOAD RACK and the special washer. It is needed that the LOAD RACK is to be set correctly to the LOAD GEAR T.

**Note 1:** Use a torque driver (VHJ-0014) for mounting the STATOR ⑥ and the ROTOR ④. Set fastening torque to 3 kg-cm.

**Note 2:** When the drum unit has been replaced, perform a tape path adjustment as instructed in 6-4. and perform a CH-1/CH-2 switching position adjustment of the servo circuit.

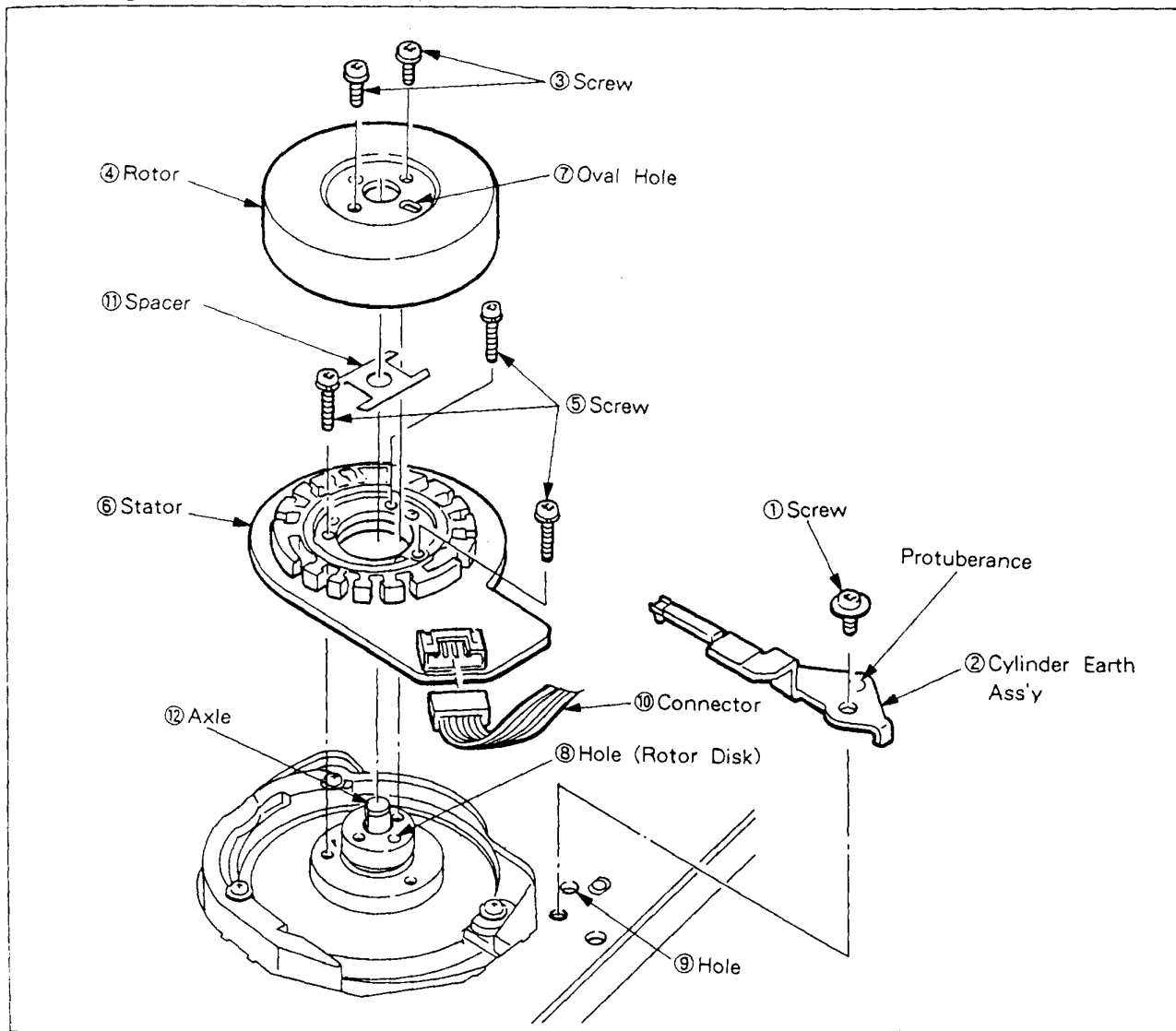


Fig. 5-11-1. Drum Motor

5-11-2. Drum Unit (See Fig. 5-11-2.)

1. Removal

- 1) For some models with the board located above the upper drum, remove the board.
- 2) Remove the flexible P.C.B. ① from the PRE-AMP UNIT (take care not to pull the flexible P.C.B. in the upward direction).
- 3) Remove the LOAD RACK only, as instructed in 5-4-1.
- 4) Remove the three screws ②, then remove the drum unit ③.

NOTE: When removing and remounting the drum unit, handle it carefully to protect it from scratches and dirt.

2. Remounting

- 1) While aligning the drum unit ③ to the protuberance, mount it to the drum base (CYLINDER BASE) ⑤ with the three screws ②.
- 2) Mount the ROAD RACK as instructed in 5-4-1.
- 3) Insert the flexible P.C.B. into the PRE-AMP UNIT.
- 4) Clean the drum unit.
- 5) Perform the tape path adjustment as instructed in 6-4. and perform the CH-1/CH-2 switching position adjustment of the servo circuit.

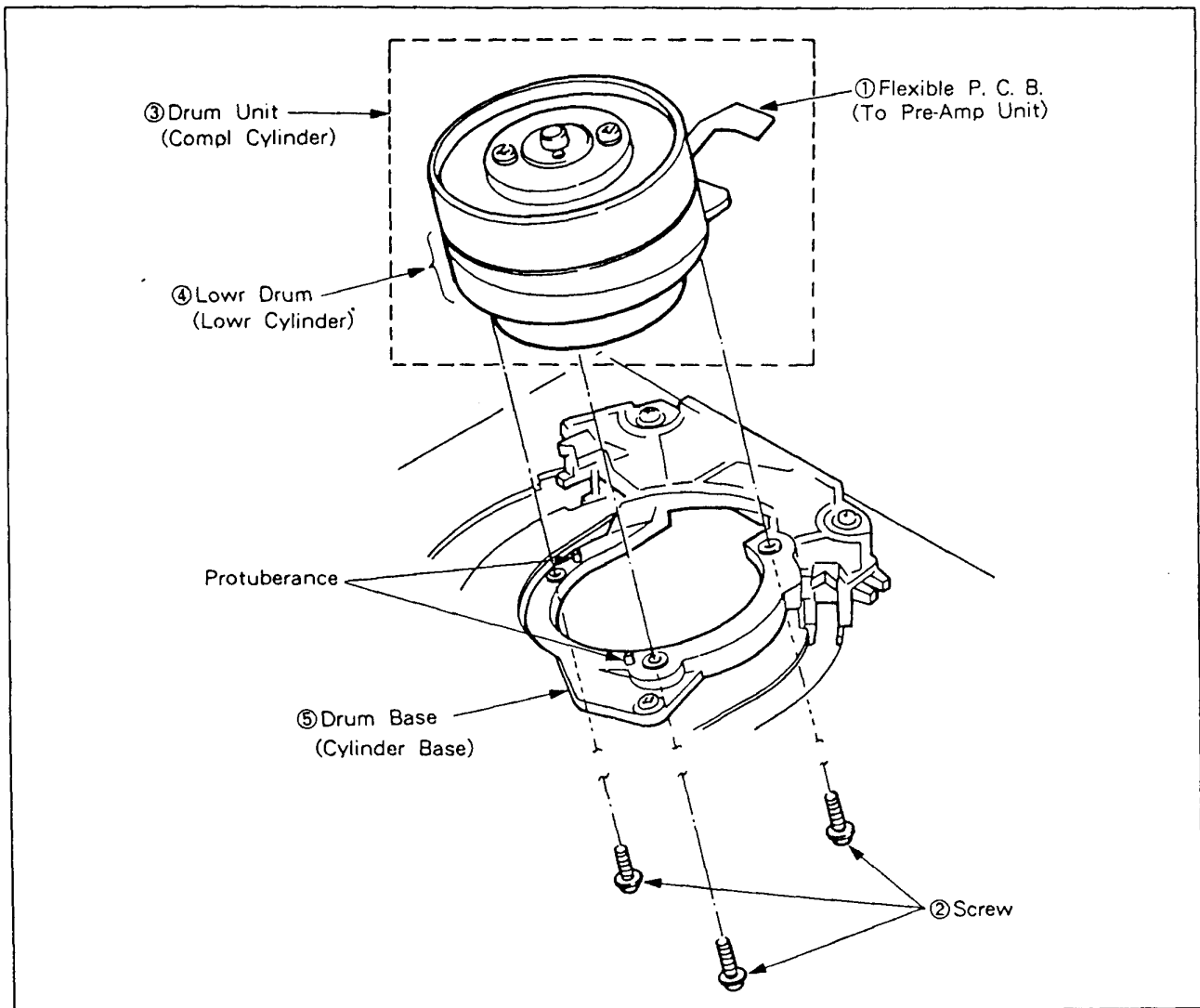


Fig. 5-11-2 Drum Unit (Compl Cylinder)

### 5-11-3. Upper Drum (Upper Cylinder)

#### 1. Removal

- 1) Remove the two screws ① (see Fig. 5-11-3).
- 2) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum (UPPER CYLINDER), remove the lead wires soldered from the P.C. board (see Fig. 5-11-4.).
- 3) Turn the head removing jig (VHJ-0041) handle ② counterclockwise to lift up the stopper ③ (see Fig. 5-11-5.).
- 4) Insert the two long screws ④ of the jig into the screw holes ⑥ located on the head chip side of the upper drum (UPPER CYLINDER) ⑤, then mount by turning the handle clockwise.
- 5) While holding the jig so that the upper drum ⑤ does not rotate, turn the handle ② clockwise to remove the upper drum.
- 6) Remove the jig from the upper drum.

**Note :** Handle parts carefully to protect the drum from scratches and dirt, and the video head from damage.

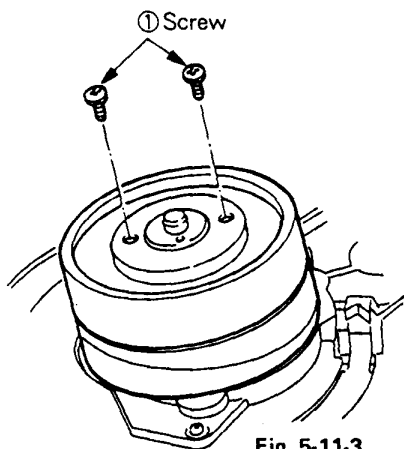


Fig. 5-11-3

Lead wires of Rotary Erase Head (Model for flying erase capability)

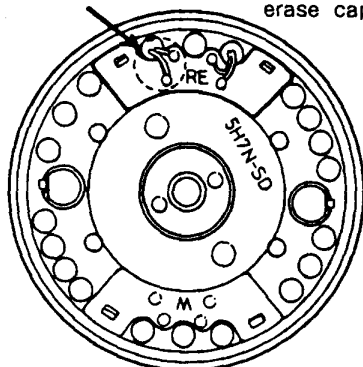


Fig. 5-11-4

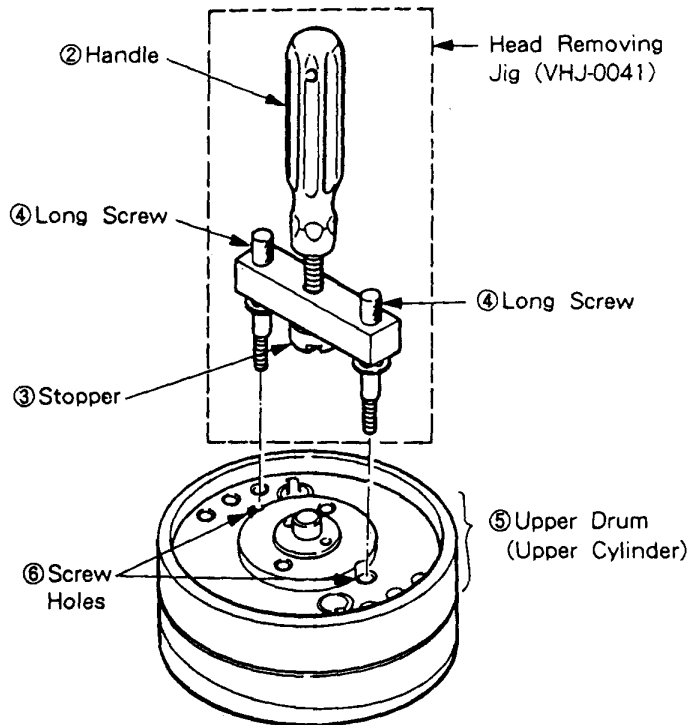


Fig. 5-11-5

Upper Drum (Upper Cylinder)

## 2. Remounting (See Fig. 5-11-6.)

- 1) Confirm that surfaces where the flywheel and the upper drum (UPPER CYLINDER) are engaged or make contact portion are free from scratches and dirt.
- 2) The code name ① of the drum is printed on the video head side of the upper drum ⑤ SP CH-1 (channel A, plus azimuth). The code name ① is set with in the rotary transformer terminal round hole side ② position of lower drum (LOWER CYLINDER), so that the two screw holes ③ of the upper drum are aligned with the two screw holes ④ of the flywheel. (Refer to 3. Recognizing the SP CH-1 Head side).
- 3) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum, pass the lead wires through the lead wire hole. (See Fig.5-11-4.)

- 4) While keeping the upper drum ⑤ parallel to the lower drum (LOWER CYLINDER) ⑧, insert it completely into the flywheel.
- 5) Temporarily tighten the two screws ⑦ alternately a little at a time, then tighten them to a torque of 6kg-cm using a torque driver (VHJ-0014) and a 3mm bit (VHJ-0045).
- 6) In case the RE head is attached to the upper drum ⑤, solder the lead wires to the P.C. board. Solder the red lead wire to the R terminal, and the yellow lead wire to the Y terminal.

**Note:** When the upper drum has been replaced, perform a tape path adjustment as instructed in 6-4. and CH-1/CH-2 switching position adjustment of the servo circuit.

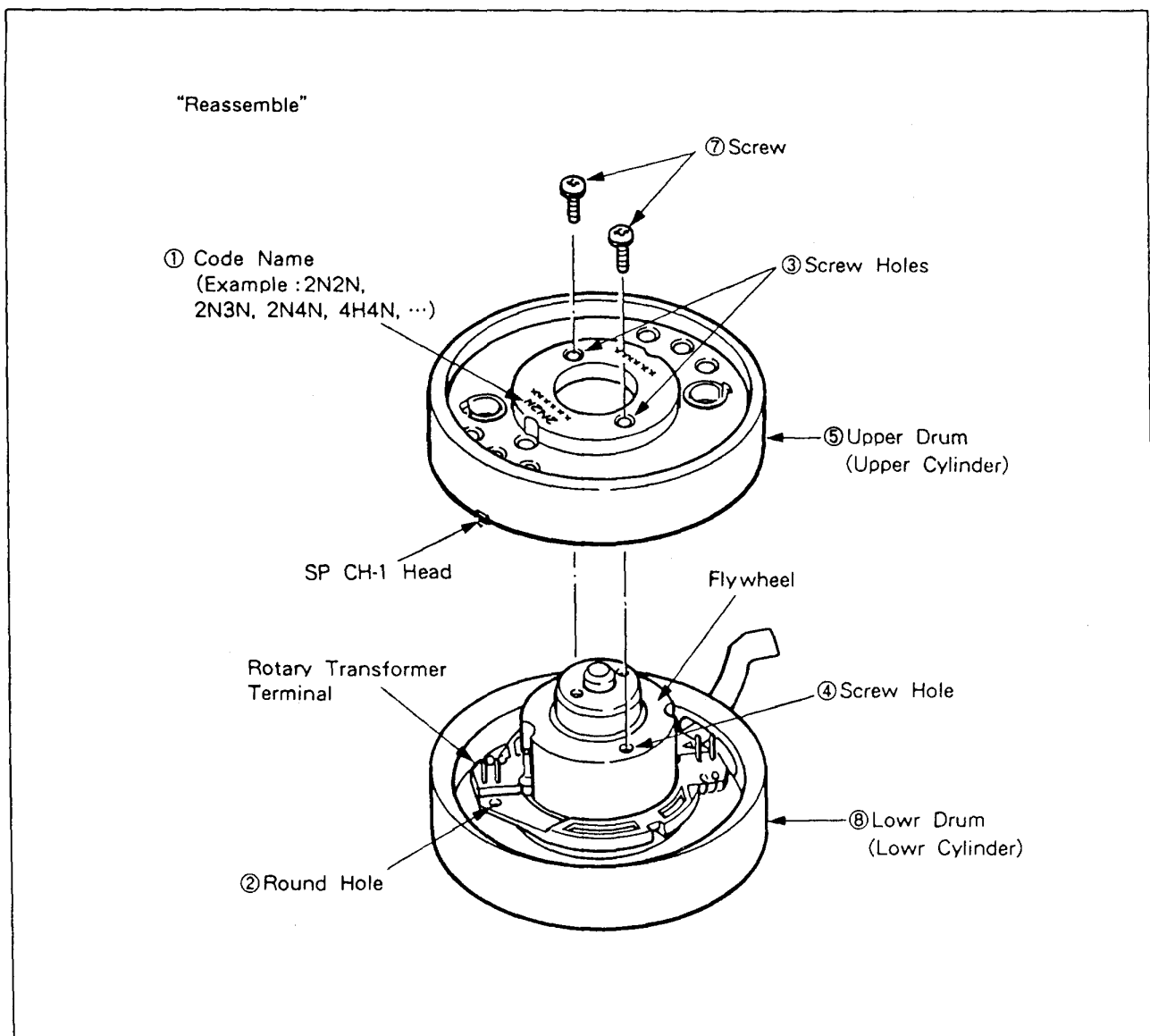


Fig. 5-11-6.



### 3. Recognizing the SP CH-1 Head Side

No playback picture can be obtained if the video head is not wired as a pair with the rotary transformer located inside the lower drum rotating section. Therefore, mounting position should be matched when mounting the upper drum. In the P90 mechanism series, the code name of the drum is printed on the SP CH-1 (CH-A, plus azimuth) side as a mark for mounting the upper drum. (See Fig. 5-11-7.) This code name differs according to the drum type, but its basic form is as follows:

A = Number of head bases

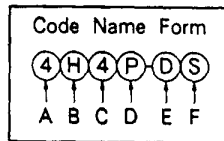
B = "N" for normal audio

"H" for HI-FI audio

C = Number of heads

D = TV system ("N" or "P")

EF = Code for detailed classification. Depending on drum type, it can also be just one character, or a blank space.



Examples of Detailed Classification Codes

V = Head with level difference

D = Compatible with digital units

S = SVHS-compatible

Examples of Code Names

2N2P, 2N2P-L, 2N2P-V, 2N2P-D, 2N3P, 2N4P, 4H4P, 4H4P-D

Moreover, there is a round hole with marking purposes on the SP CH-1 (CH-A, plus azimuth) side of the lower drum rotary transformer terminal. As shown in Fig. 5-11-8, there are two types of rotary transformer terminals (the number of pins differs according to the number of heads).

**Note:** When ordering parts such as drums (CYLINDERS), do not use the code names; always refer to the parts list and order with the specified part numbers.

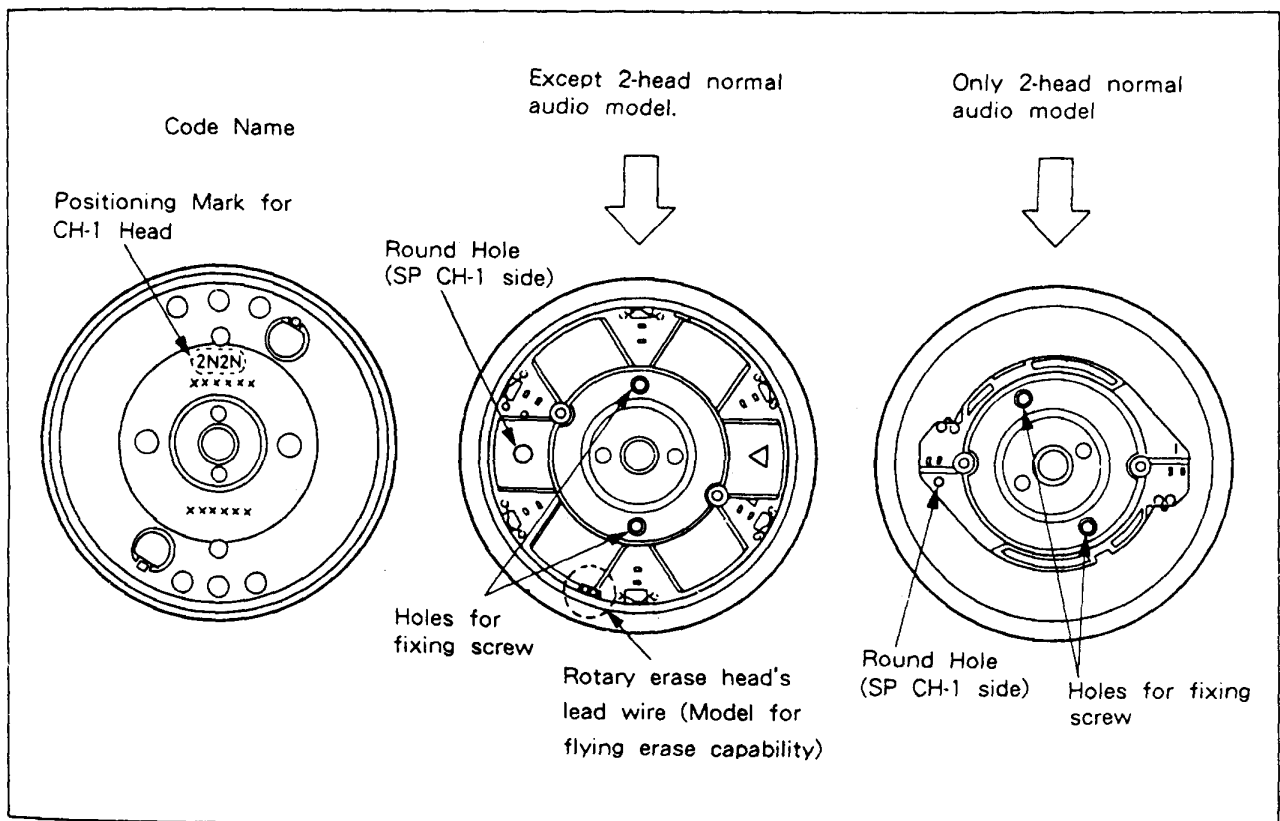


Fig. 5-11-7. Upper Drum

Fig. 5-11-8. Lower Drum

## 5-12. HOW TO PROCEED WHEN THE CASSETTE CANNOT BE REMOVED

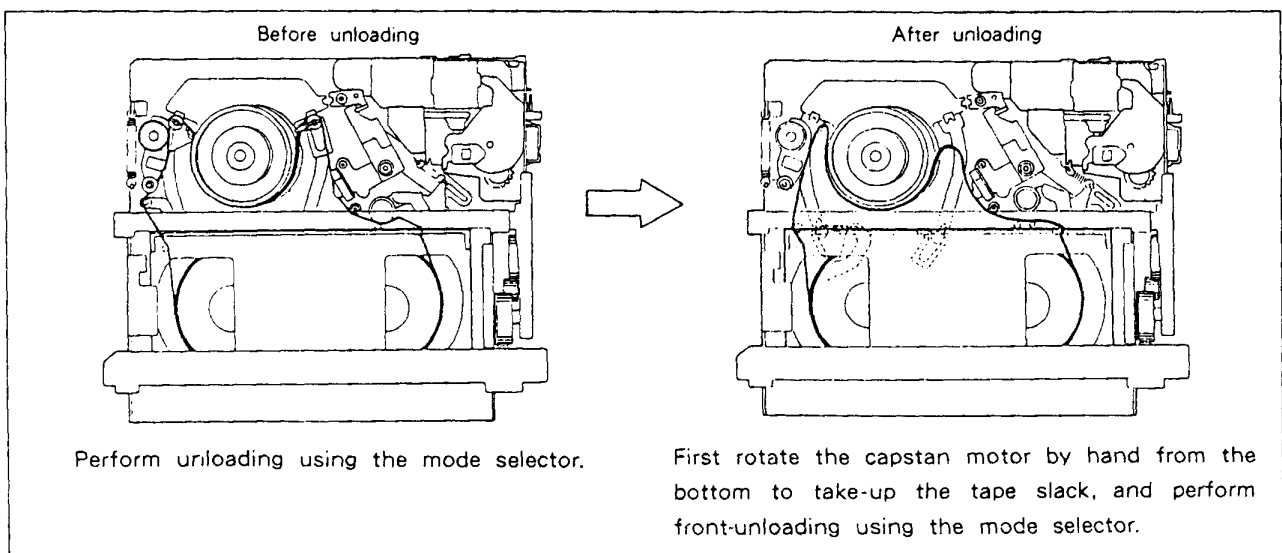
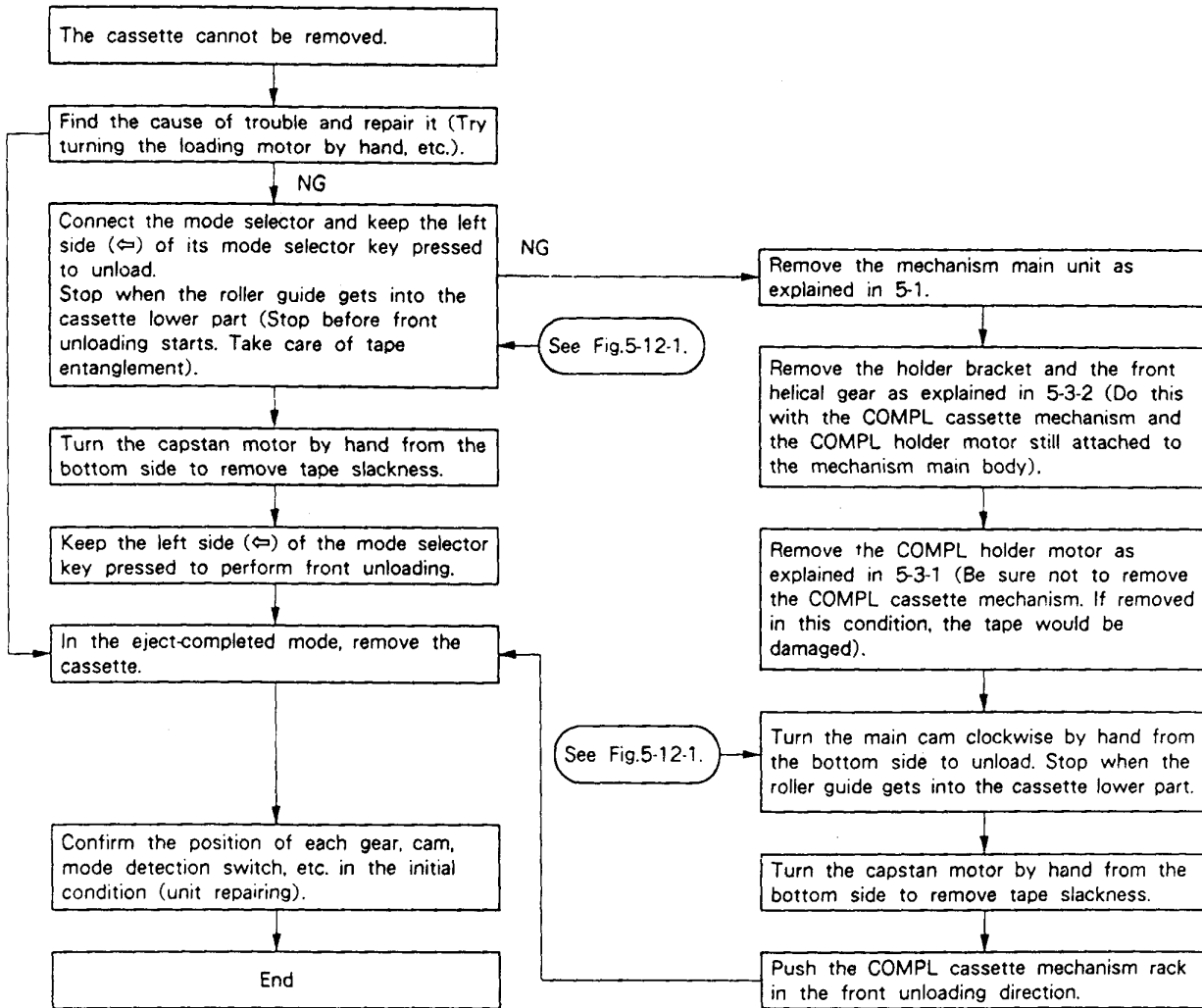


Fig. 5-12-1

## 5-13. AUTO HEAD CLEANER MECHANISM (See. Fig. 5-13-1 • Fig. 5-13-2 • Fig. 5-13-3)

### 1. Removal

**Note:** • Do not hold the ROLLER CLEANER ASS'Y ① by bare hand. Use tweezers and gloves not soiled with grease or dust, etc.

• When the cleaning function deteriorates and replacing only ROLLER CLEANER ASS'Y ①, there is no need to perform item 4).

- 1) Make sure that the ROLLER CLEANER ASS'Y ① is not pressed against a drum (cylinder).
- 2) Remove the PRE-AMP UNIT and the PRE-AMP BRACKET.
- 3) Remove screw ②, then lift up and remove the BRACKET CLEANER ASS'Y ③.
- 4) With the BRACKET CLEANER ASS'Y ③ is fixed by finger, turn the LEVER CLEANER ASS'Y ④ 35° to 40° to clockwise, then lift up and remove.
- 5) Remove the stop washer ⑤, then remove the ROLLER CLEANER ASS'Y ①.

### 2. Remounting

- 1) Mount the ROLLER CLEANER ASS'Y ① and the stop washer ⑤ to the axle ⑥ of LEVER CLEANER ASS'Y.  
Mount the ROLLER CLEANER ASS'Y ① so that the mark shown in Fig. 5-13-2 is up side. If the mark is down side, noise may occur.
- 2) Mount the SPRING COIL ⑧ and the LEVER CLEANER ASS'Y ④ to the axle ⑦ of BRACKET CLEANER ASS'Y. At this time, hook the SPRING COIL ⑧ to the hole ⑨ of the LEVER CLEANER ASS'Y and the bent part ⑩ of the BRACKET CLEANER ASS'Y. "A part" of the LEVER CLEANER ASS'Y should be under "B part" of the BRACKET CLEANER ASS'Y.
- 3) Fix the BRACKET CLEANER ASS'Y ③ on screw hole ⑫ by screw ②. Before fasten screw ②, insert hole ⑪ of the BRACKET CLEANER ASS'Y to axle ⑬, axle ⑦ to hole ⑬ to match positions. Pin ⑭ of the LEVER CLEANER ASS'Y should be run along the circumference of the MAIN CAM ⑮ not to be came off.
- 4) The upper side of the lower drum should be within approx. 2mm from the lower side of the ROLLER CLEANER ASS'Y as shown in Fig. 5-13-3.
- 5) Mount the PRE-AMP BRACKET and the PRE-AMP UNIT.

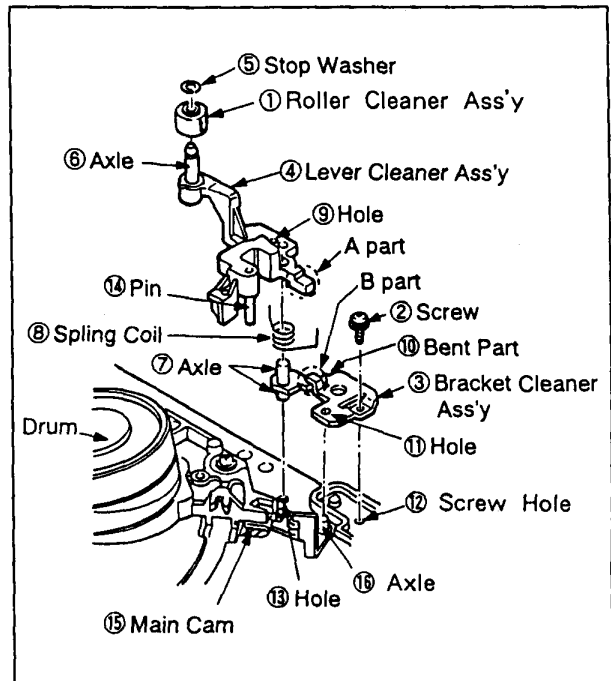


Fig. 5-13-1

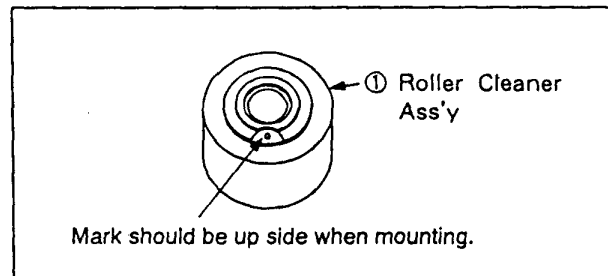


Fig. 5-13-2

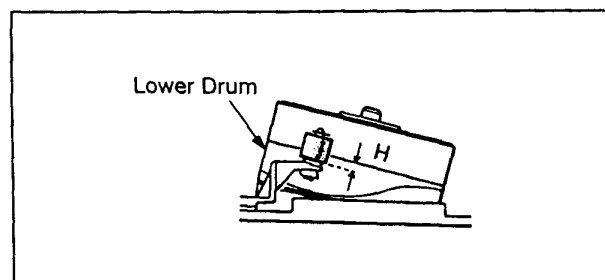


Fig. 5-13-3

## SECTION 6 MECHANISM ADJUSTMENTS

### 6-1. OPERATING THE MECHANISM WITH NO CASSETTE INSERTED (See Fig. 6-1-1.)

- 1) Attach black vinyl tape to the T. END and T. TOP sensors to prevent light from entering.
- 2) Push the TRAY LOCK LEVER in the direction of the arrow to maintain the unlocked condition. Release the lever just before the TRAY starts moving down.
- 3) In this condition, operation is possible in every mode. However, the following procedures are necessary to operate the unit in the REC, REW and R-SEARCH modes.

REC mode :

Push the SAFETY SW LEVER to turn the SAFETY SWITCH (Erasure Prevention Switch) ON, then press the REC button. If the SAFETY SWITCH is not turned ON, the unit will enter the EJECT mode.

REW/R-SEARCH :

After pressing the REW button, turn the TAKE-UP REEL ASS'Y by hand. Otherwise, the reel sensor will operate, setting the INITIAL mode after 2 to 3 seconds.

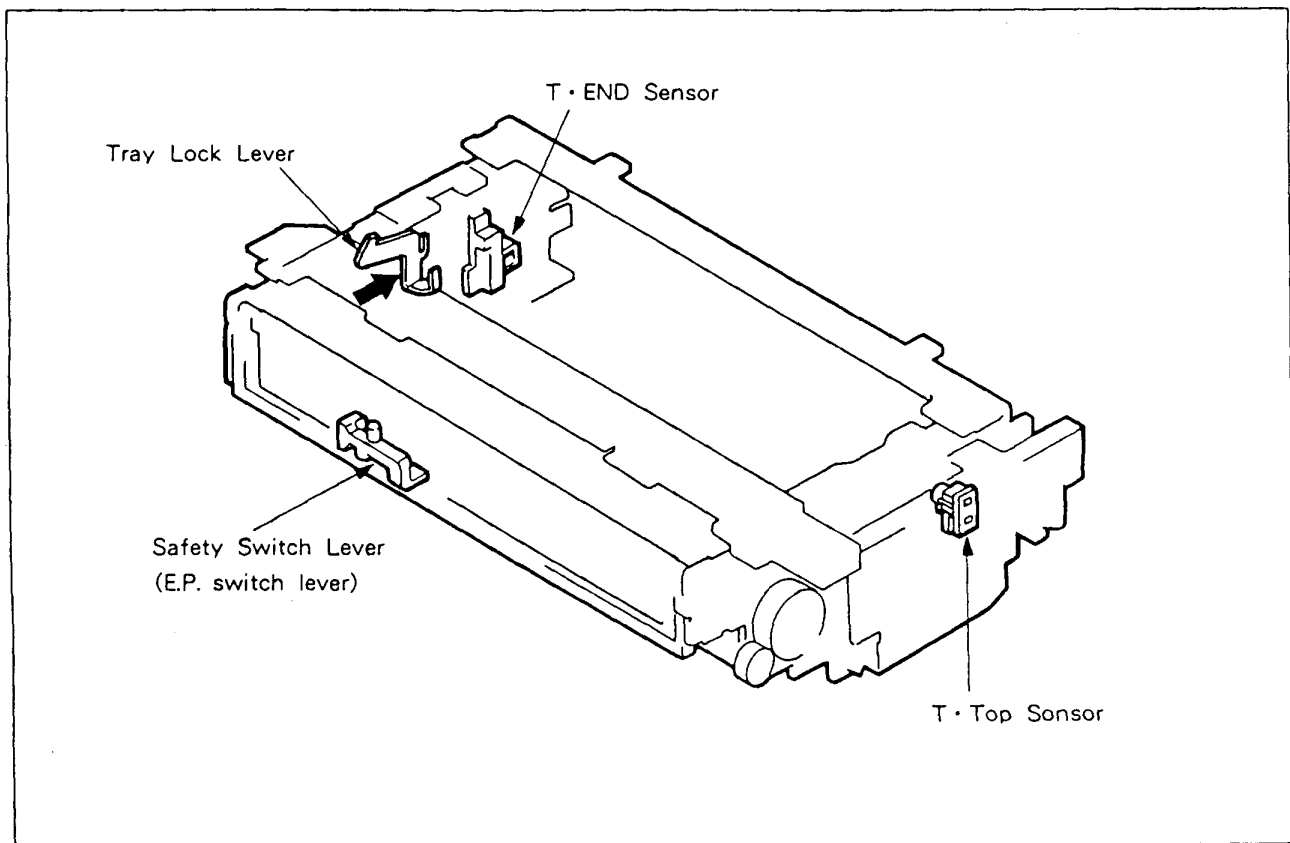


Fig. 6-1-1. Preparations for Adjustment

## 6-2. REEL TABLE HEIGHT ADJUSTMENT AND TORQUE CHECK

### 6-2-1. Reel Table Height (See Fig. 6-2-1.)

If the SUPPLY REEL ASS'Y or the TAKE-UP REEL ASS'Y is replaced, it will be necessary to adjust the REEL TABLE height.

- (1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
- (2) Attach the master plane (H-7099-279-H) and reel disc height jig (H-7099-038-H) in the direction of the arrows.
- (3) Confirm that, when the gauge stops, the REEL TABLES are not in contact with surface A of the plate and side of the REEL TABLES are in contact with surface B.
- (4) If the REEL TABLE is in contact with surface A, remove a spacer and check again.
- (5) If the REEL TABLE is not in contact with surface B, add a spacer and check again.
- (6) Remove the master plane.
- (7) Set the EJECT mode with the mode selector.
- (8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.

#### Note:

- Adjust the reel table height by adding or removing spacers (0.13t, 0.25t, 0.3t, 0.4t and 0.5t) as appropriate so that the height meets the specifications. Use the same method for both the TAKE-UP REEL TABLE and the SUPPLY REEL TABLE.  
(The 0.5t washer is included as the standard washer for the SUPPLY REEL ASS'Y. The 0.4t washer is included as the standard washer for the TAKE-UP REEL ASS'Y.)
- If the height of the reel table is not within the specified value, the tape edge might be damaged as a result, or the tape path adjustment might not be possible to make.

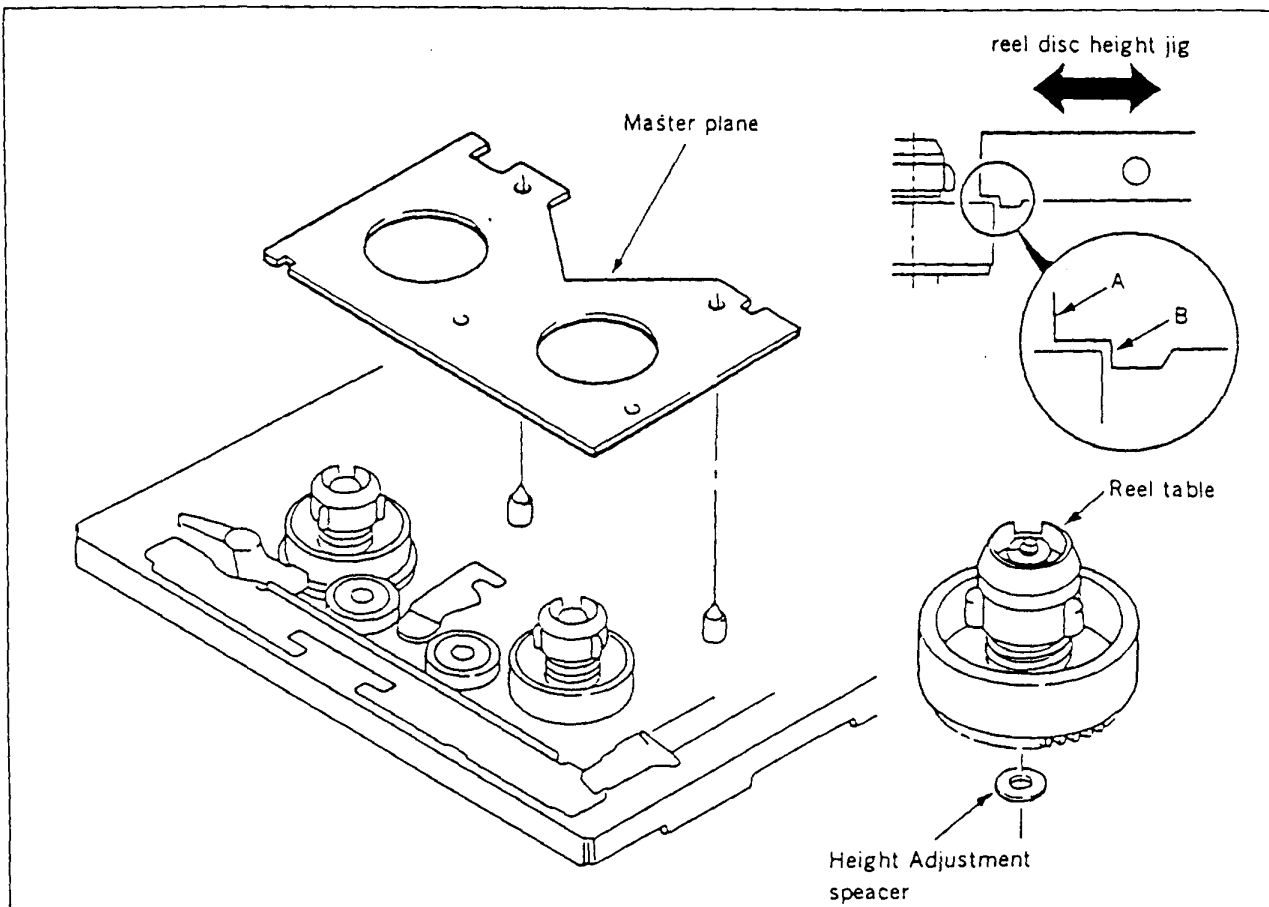


Fig. 6-2-1. Reel Table Height Adjustment

### 6-2-2. Torque Check (See Fig. 6-2-2.)

- 1) Set the unit to operating condition without a cassette inserted as instructed in 6-1.
- 2) Measure the SUPPLY REEL TABLE torque in the REW mode, and confirm that it is 750gcm or more. Perform this measurement keeping the torque gauge in a fixed position with your hand (locked torque).
- 3) Measure the TAKE-UP REEL TABLE torque in the F.FWD mode, and confirm that it is 600gcm or more (locked torque).
- 4) Measure the TAKE-UP REEL TABLE torque in the playback mode (SP tape speed), and confirm that it is within 80 through 140gcm (locked torque).
- 5) Measure the SUPPLY REEL TABLE torque in the REV (F-SEARCH) mode, and confirm that it is within 150 through 240 gcm (locked torque).

- 6) After confirming that torque readings are within the specifications for each mode, check the following :

- Ⓐ Dirt on the capstan motor and the REEL PULLEY groove.
- Ⓑ Deterioration of the REEL DRIVE BELT.
- Ⓒ Deterioration of the FRICTION GEAR ASS'Y felt (torque during playback).
- Ⓓ Wear and damage of the COMPL CLUTCH MECHANISM and the reel drive system gears.

Note1 : Items Ⓑ, Ⓒ and Ⓓ require replacement if found defective.

Note2 : The measured value of torque during FF and REW represents the value 2 seconds after starting.

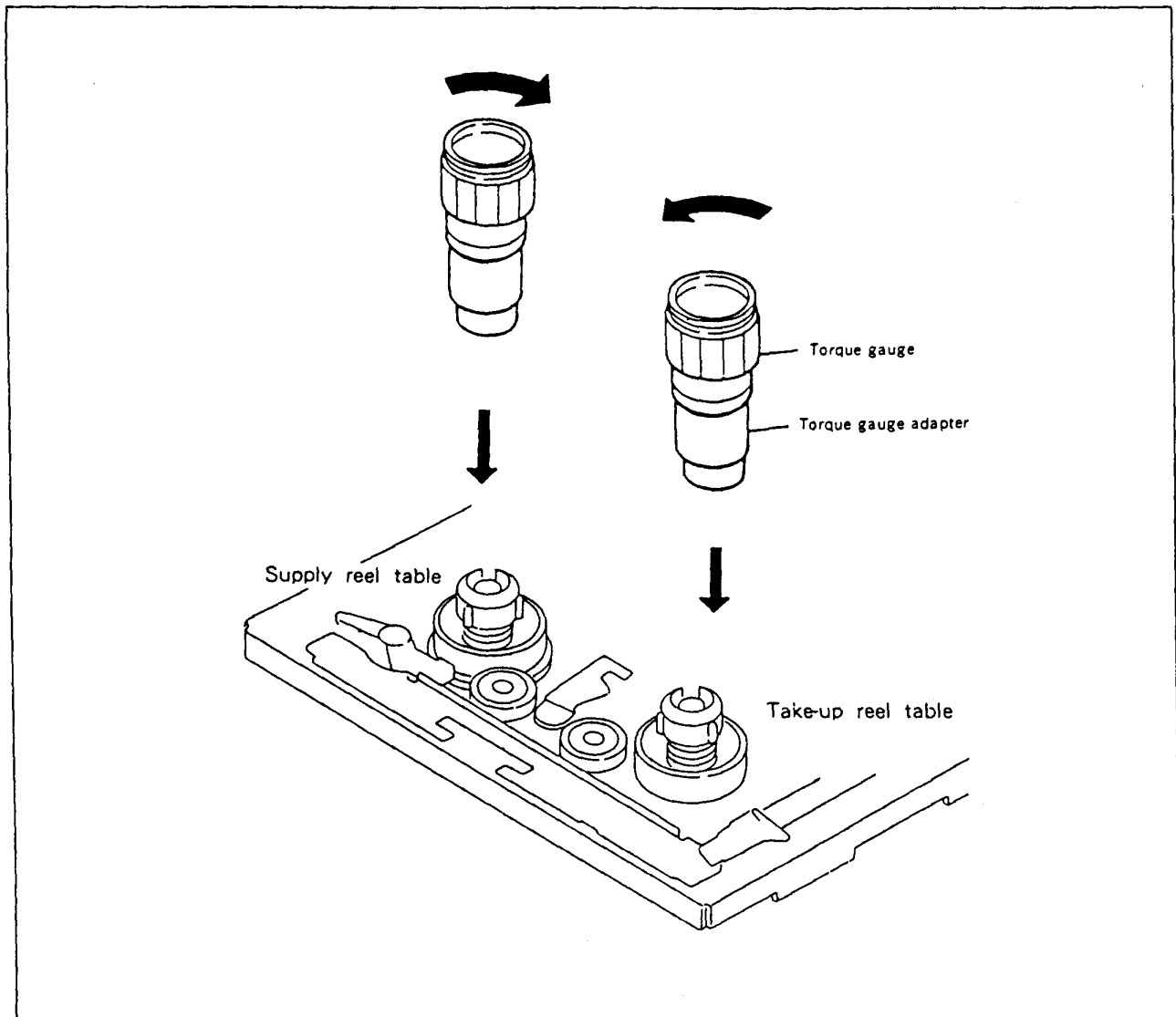


Fig. 6-2-2 Checking REW/FF/PLAY Torque

### 6-3. TENSION POLE (BACK TENSION GUIDE) POSITION ADJUSTMENT AND BACK TENSION TORQUE CHECK

#### 6-3-1. Tension Pole (Back Tension Guide) Position Adjustment (See Fig. 6-3-1.)

- 1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
- 2) Set the PLAY mode with the mode selector (VHJ-0050)
- 3) Confirm that the space between the end of chassis and the Tension arm is from 4mm to 6mm.
- 4) In case the tension pole is not within 4-6mm, adjust it by loosening the screw ④ a little and changing the mounting position of the BAND HOLDER ⑤ in the direction of the arrow A.
- 5) Set the EJECT mode with the mode selector.
- 6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
- 7) Confirm that back tension torque is within  $42 \pm 5$ gcm, as instructed in 6-3-2 below.

#### 6-3-2. Back Tension Torque Check (See Fig. 6-3-1.)

- 1) Attach the cassette torquemeter (VHT-063S) and set the PLAY mode.
- 2) Confirm that back tension torque is within  $50 \pm 10$ gcm.
- 3) In case back tension torque does not meet the above specification, proceed as follows:
  - Ⓐ Clean the portion where the brake band (BAND HOLDER ASS'Y) ⑦ of the SUPPLY REEL ASS'Y ⑥ makes contact.
  - Ⓑ Confirm that the brake band of the BAND HOLDER ASS'Y ⑦ does not make wear and that it is clean. If wear or dirt is found, replace the band holder assembly ⑦ as instructed in 5-7-3 of Service Manual.
  - Ⓒ Replace the TENSION LEVER ASS'Y SPRING COIL ⑧.

Note: Always follow procedures in 6-3-1. Tension Pole Position Adjustment after performing Ⓐ, Ⓑ and Ⓒ.

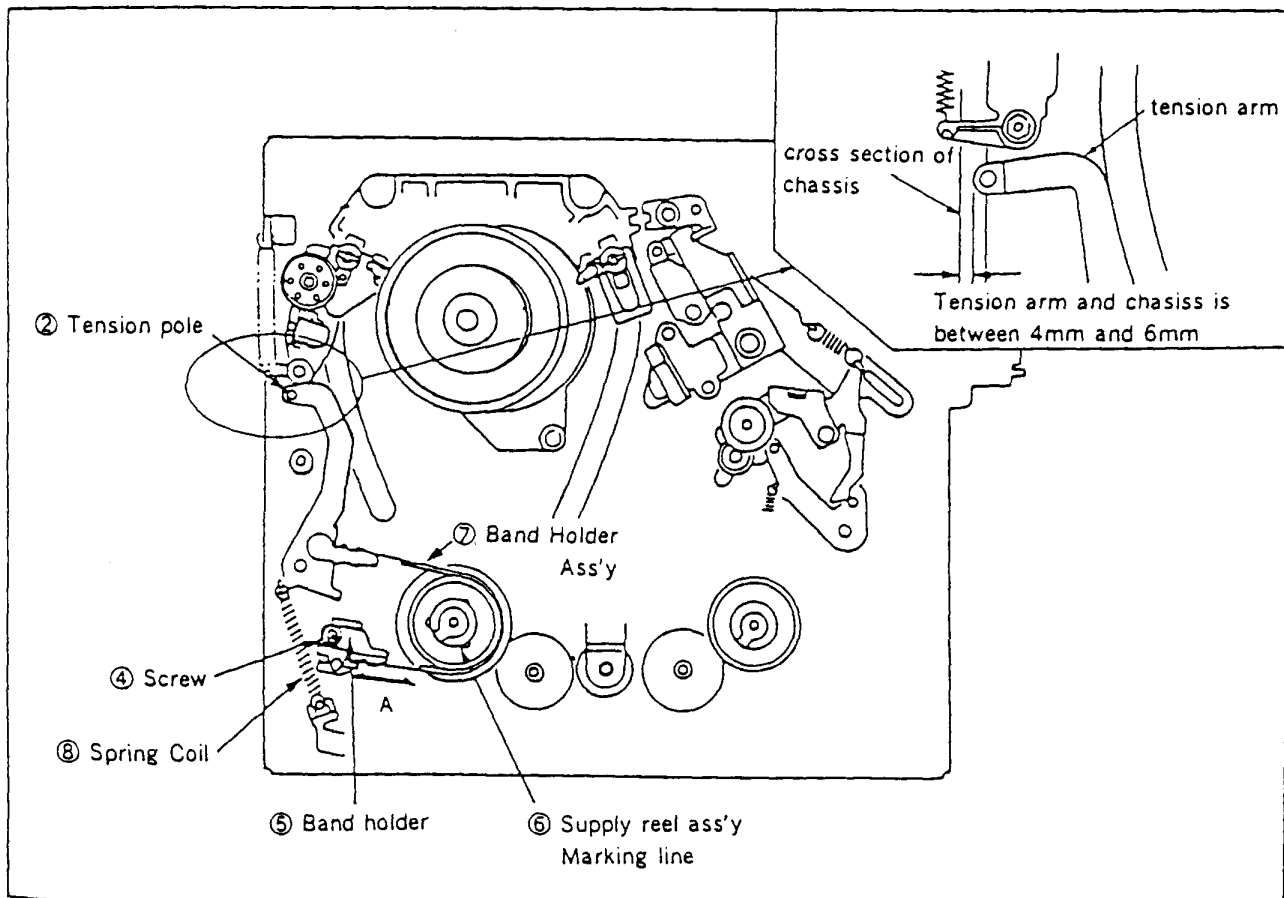


Fig. 6-3-1. Tension Pole Positioning Adjustment



## 6.4. TAPE PATH ADJUSTMENT

The tape path mechanism is precisely adjusted at the factory. Normally no readjustment is required, but checking and/or adjustment is necessary when parts of the tape path mechanism among those shown in the figure below (See Fig. 6-4-1.) have been removed or replaced after a long period of use.

This operation consists of adjusting the various guides so that the tape drawn out from the supply reel runs smoothly along the DRUM (CYLINDER) lead surface. A way of grasping the tape path condition by electronic means is monitoring the video head output envelope waveform with an oscilloscope. However, the fact that visual observation is essential in order to know whether the tape is running through the various guides in a smooth and natural way should be kept in mind when checking and adjusting.

Also remember that the position of tape guides is not greatly affected by the replacement of the UPPER DRUM (UPPER CYLINDER) or the COMPL DRUM (COMPL CYLINDER), provided that it is correctly performed, and that only the replaced parts should be adjusted after replacing a tape guide or COMPL HEAD BRACKET, since the position of the other tape guides shall not change considerably.

### 6-4-1. Preparations for Adjustment

- (1) Clean the tape transport surfaces (See Fig. 6-4-1.).
- (2) Connect the oscilloscope. Connect the channel 1 probe to the envelope waveform test point, and the channel 2 probe to the SW30 (RF SW P) test point. During adjustment, apply a trigger to the low side of the SW30 (RF SW P) in order to monitor the waveform output from channel 1 of the video head.  
**Note:** Since oscilloscope connection points differ according to the model, refer to the "Test Point for Tape Path Adjustment" allocation figure in the electric circuit adjustment section of the service manual book.
- (3) Use a dentist's mirror for visual observation of tape path condition.
- (4) Use an eccentric driver (VHJ-0003) for adjustment of the guide rollers.
- (5) When adjusting height of the fixed guide, guide rollers or COMPL head bracket, turn the special nut or the upper flange clockwise to push the tape downward, and counterclockwise to make the tape rise up.
- (6) Do not use the damaged cassette tapes for tape path adjustment.

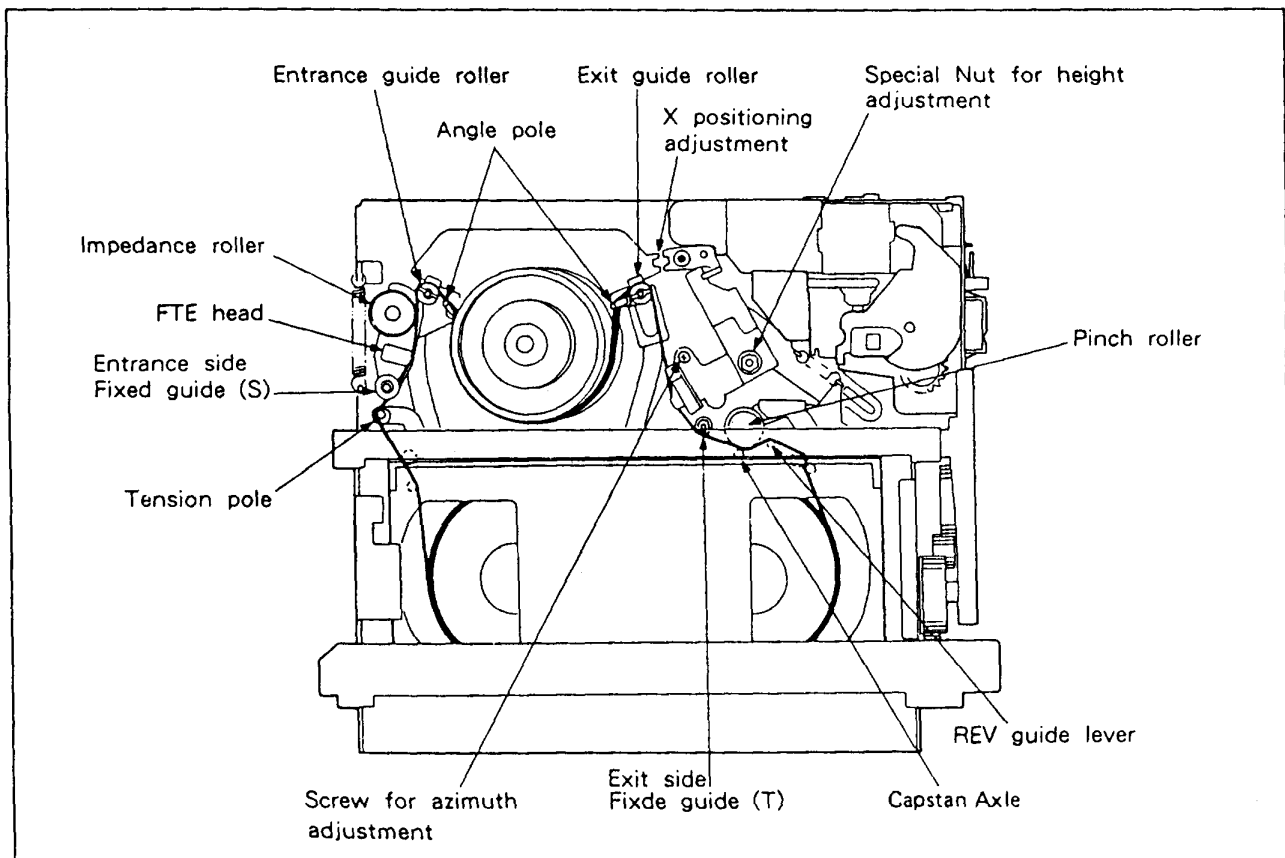


Fig. 6-4-1. Preparation for Adjustment



**6-4-2. Adjustment by Visual Observation after Guide Roller, COMPL Head Bracket Replacement**

Perform this adjustment after removing or replacing any of the above parts. Only for the replaced or removed parts, play back an alignment tape (MH-2) beforehand and adjust height by visual observation.

(1) Guide Rollers (See Fig. 6-4-3.)

The tape should not be curled by the guide roller upper and lower flanges. It should also run smoothly, without moving up and down on the DRUM (CYLINDER) lead surface.

**Note :** An excessive guide roller pressure may cause tape damage.

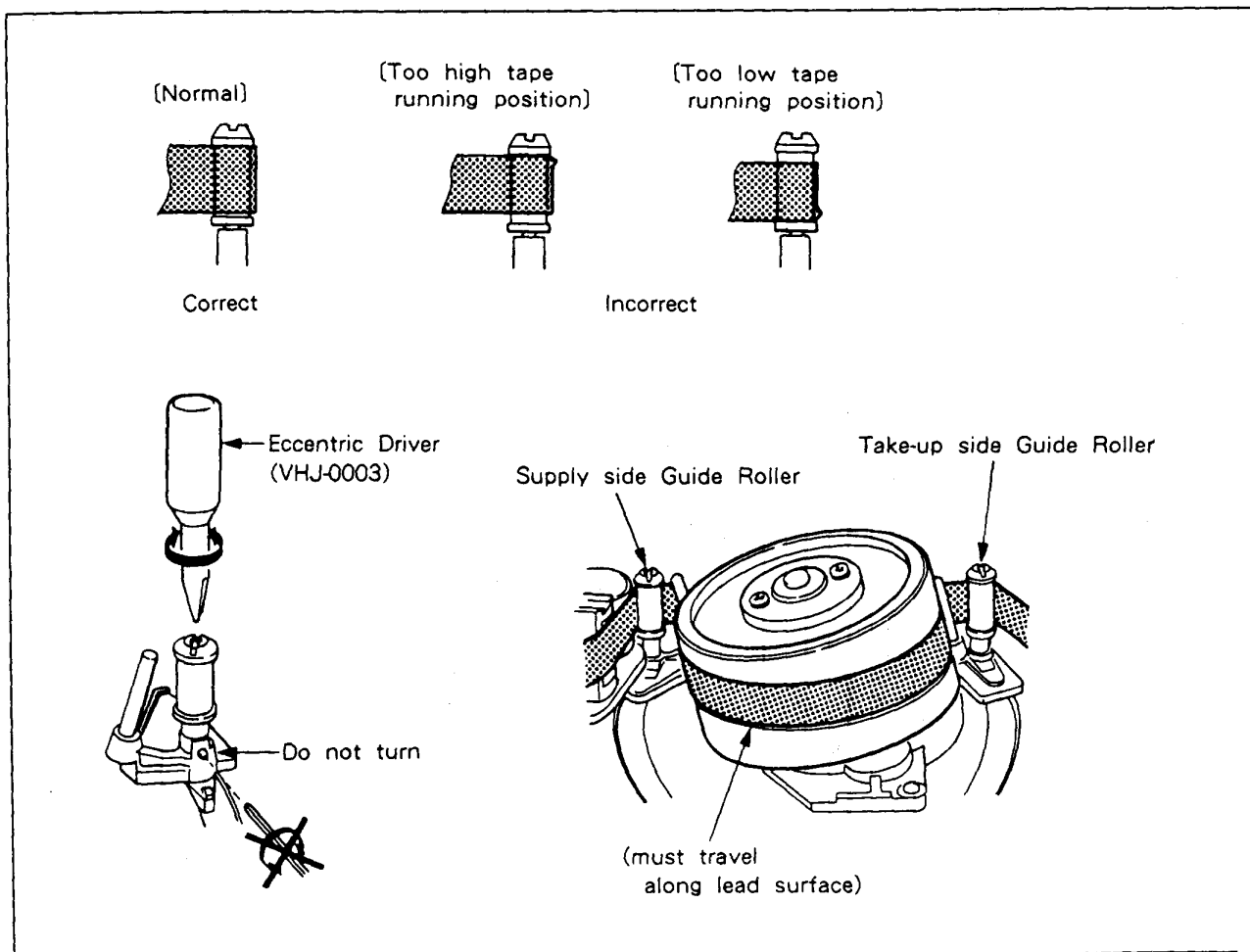


Fig. 6-4-2. (2) Pre-set for Guide Roller

(2) COMPL Head Bracket (ACE Head) (See Fig. 6-4-3.)

Adjust the special nut so that the tape edge runs between the audio head upper end and the control head lower end. Gaps A and B should be of about the same width. Since at this point it is only required that the control signal is picked up and the servo circuit works normally, no adjusting screws except the COMPL head bracket special nut should be touched.

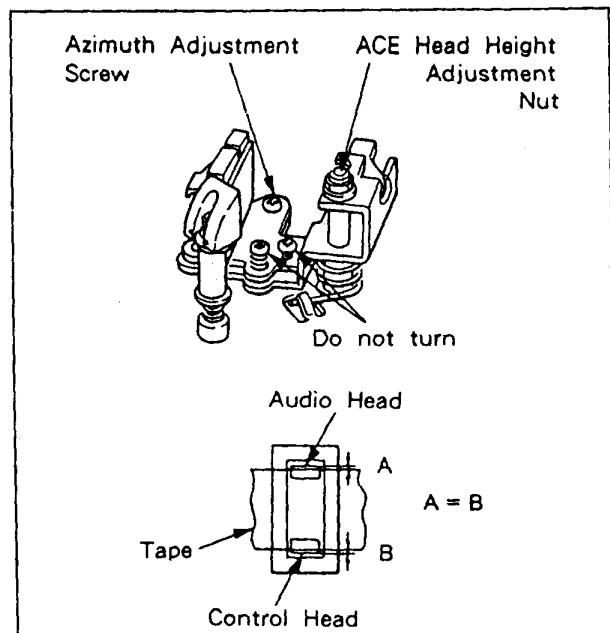


Fig. 6-4-3. (3) Pre-set for Compl Head Bracket

**6-4-3. Guide Roller Adjustment (See Fig. 6-4-4.)**

- 1) Play back the alignment tape (MH-2), press the tracking control key and adjust the envelope waveform to the maximum level.
- 2) Loosen the entrance and exit guide rollers by rotating them counterclockwise, then rotate them clockwise alternately until they are fastened and a flat video output waveform is obtained.
- 3) Confirm that the envelope waveform is not deformed, and check visually that no curling occurs at the guide roller upper and lower flanges.

- 4) Press the tracking control key and set the envelope waveform level to approx. 50% of the maximum. In this condition, confirm whether the envelope waveform is flat. It will not, showing valleys or peaks at the first half (entrance) or second half (exit), if the guide roller pressure is excessive or insufficient. In case there is unevenness in the first half (entrance), adjust the entrance side guide roller. If the second half (exit) shows trouble, adjust finely the exit side guide roller.

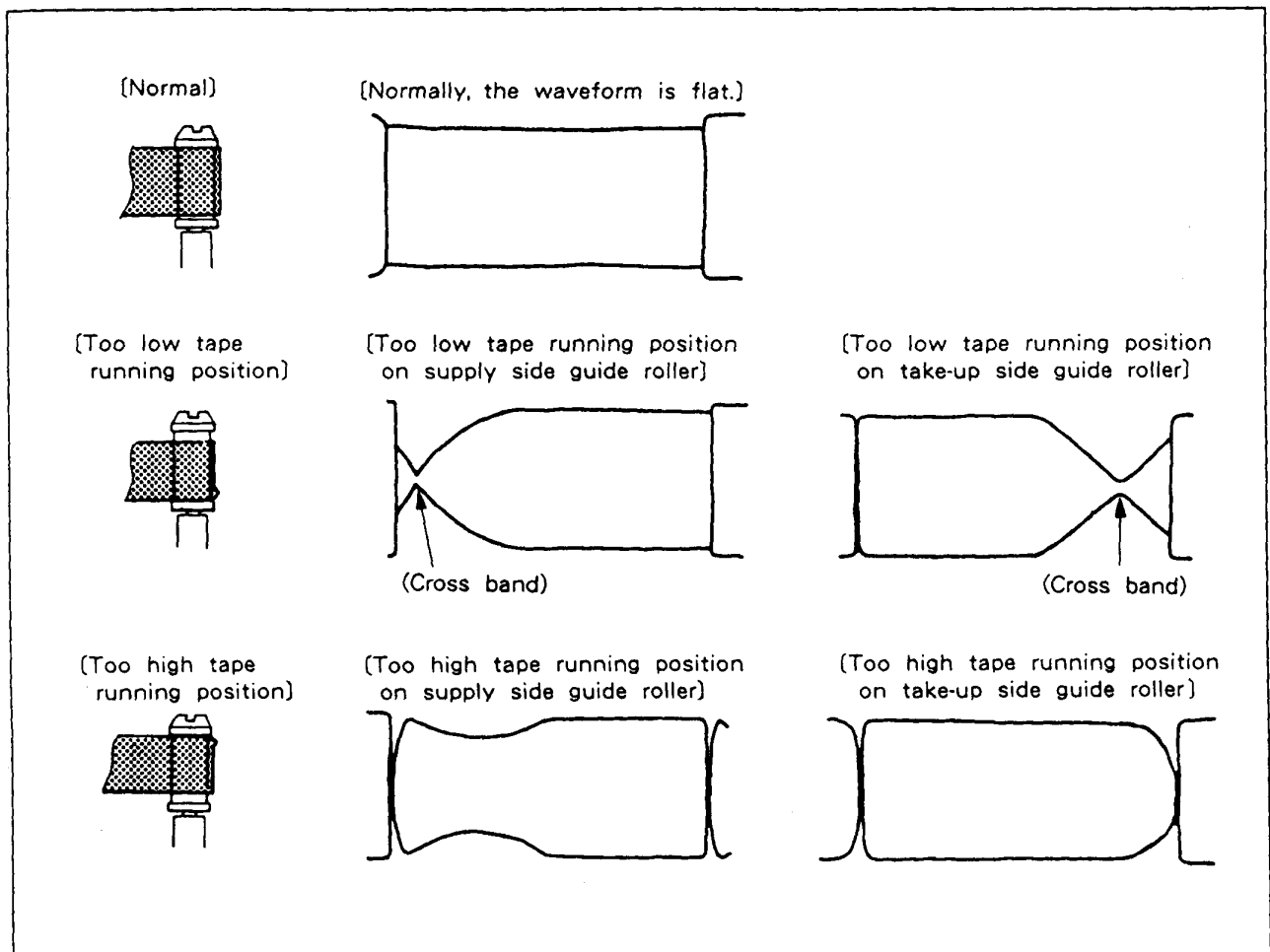


Fig. 6-4-4. Guide Roller Adjustment

#### 6-4-4. COMPL Head Bracket (ACE Head) Adjustment

(1) Height Adjustment and Azimuth Adjustment  
(See Fig. 6-4-5.)

- 1) Load the alignment tape (HiFi 400Hz) and set the PLAY mode.
- 2) Monitor the audio output waveform with the oscilloscope.
- 3) Rotate the azimuth adjustment screw until the audio output waveform amplitude is maximum.
- 4) After loosening the ACE head height adjustment special nut, rotate it slowly clockwise until amplitude of the audio output waveform is maximum, then adjust it finely clockwise to the point just before the said waveform amplitude begins to decrease.
- 5) Rotate the azimuth adjustment screw until amplitude of the audio output waveform is maximum.
- 6) Confirm that the audio output waveform amplitude does not fluctuate.

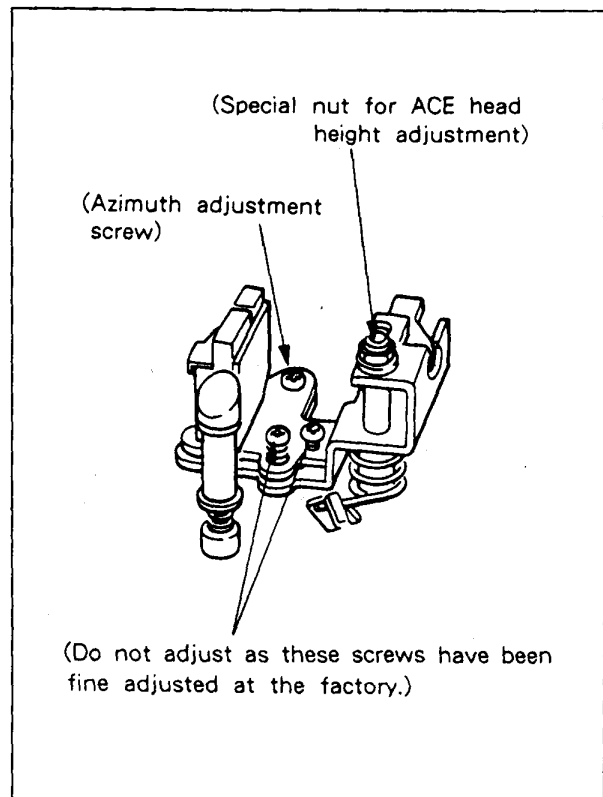


Fig. 6-4-5. Compl Head Bracket

(2) Tracking (X Value) Adjustment (See Fig. 6-4-6.)

- 1) Load the alignment tape (HiFi 400Hz) and set the PLAY mode.
- 2) Set tracking to the center position with the tracking control key (See Note below).
- 3) Rotate the stopper bracket fixing screw 180° counterclockwise.
- 4) Monitor the video head output envelope waveform with the oscilloscope.
- 5) Adjust the stopper bracket position so that amplitude of the envelope waveform becomes maximum at the tracking center and the envelope waveform amplitude changes by the same amount when shifting the tracking center by pressing the up (▲) and down (▼) tracking control keys.
- 6) Tighten the fixing screw.
- 7) (Model for LP mode tape speed capability)  
Playback the alignment tape (VHJ-0052) and set the tracking to the center using a tracking control key.  
Then confirm that the playback picture on screen is normal. If not, Make readjustment by referring to items 1) through 7). To readjust, playback HiFi 400Hz and finely adjust the position of the stopper bracket within the range in which the amplitude of the envelope waveform can be held to a maximum.
- 8) Perform servo circuit PB PHASE (Switching position) adjustment.

**Note :** For models equipped with auto tracking, always set to the manual tracking mode before adjustment. To confirm the tracking center position, press the tracking keys (▲, ▼) and observe the front panel clock display. It will read "T - : -" at the tracking center, "T - : , T - - : " when keeping the down (▼) key pressed, and "T : - , T : - -" when keeping the up (▲) key pressed. The time indication will be restored 2 to 3 seconds after the tracking keys are released.

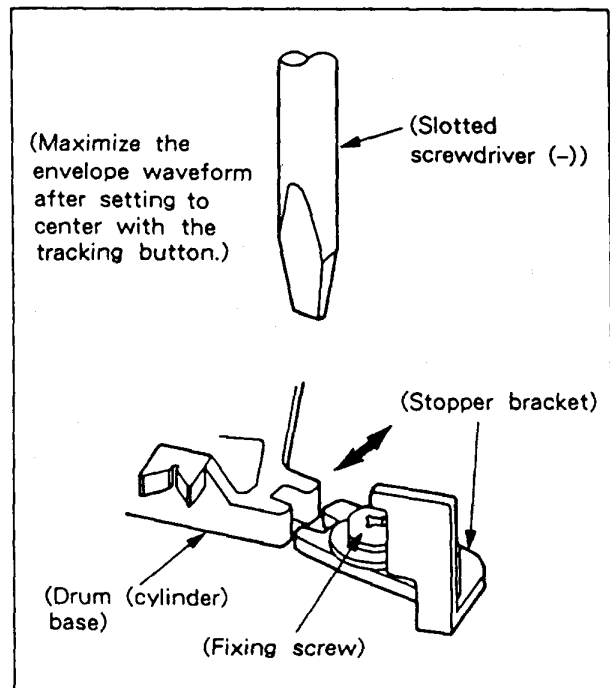


Fig. 6-4-6.

#### 6-4-5. Checking after Adjustment

Tape running may show a slight change depending upon the type of the cassette tape (thick or thin tape), the start, middle, or end of cassette tape winding, etc. After performing the tape path adjustment with use of an alignment tape, be sure to check the following points. Incidentally, the alignment tape to be used should be E-180 or E-240 cassette should be a good one without any damage to it.

- (1) Try to play back the alignment tape (MH-2) and confirm that the envelope waveform rise immediately and that there is no fluctuation in the envelope waveform and the audio output waveform.
- (2) Load a cassette tape E-180 and start recording operation in the standard mode. 1 kHz should be fed to the audio input terminal when recording. After recording, the following points should be checked.
  1. When the recorded portion is played back, the envelope waveform rise immediately, and no fluctuation in the envelope waveform is observed. Also, no speed drop occurs during the first half period or the last half period. Further, check to be sure that no fluctuation occurs in the audio waveform. Also confirm that neither the tape curling or derailing is caused on the upper or lower flange and the on the read side of the drum.
  2. Confirm that no tape curling or derailing occurs in the upper or lower flange of each tape guide and the read side of the drum during each mode of operation, namely, FF, REW, F. SEARCH, and R. SEARCH.
  3. Confirm that the envelope waveform rise immediately after changing the mode directly to the PLAY from each mode of FF, REW, F. SEARCH, R. SEARCH, or POWER OFF (INITIAL) and that no tape curling or derailing occurs in the upper or lower flange of the each tape guide and on the read side of the drum.
- (3) Load a E-240 cassette tape and perform recording operation in the SP mode. 1 kHz should be fed to the audio input terminal when recording. Now, confirm that the envelope waveform rise immediately upon starting the playback of the recorded portion, and that neither fluctuation in the envelope waveform nor a speed drop occurs during the first half period or the last half period. Also confirm that no tape curling or derailing is caused in the upper or lower flange of each tape guide and on the drum lead surface.

- (4) Perform recording for 60 seconds in the SP mode at the start of E-240 cassette winding. Play back the recorded portion and repeat the F.SEARCH ↔ R.SEARCH ten times, following which confirm that no damage is done to the tape edge.

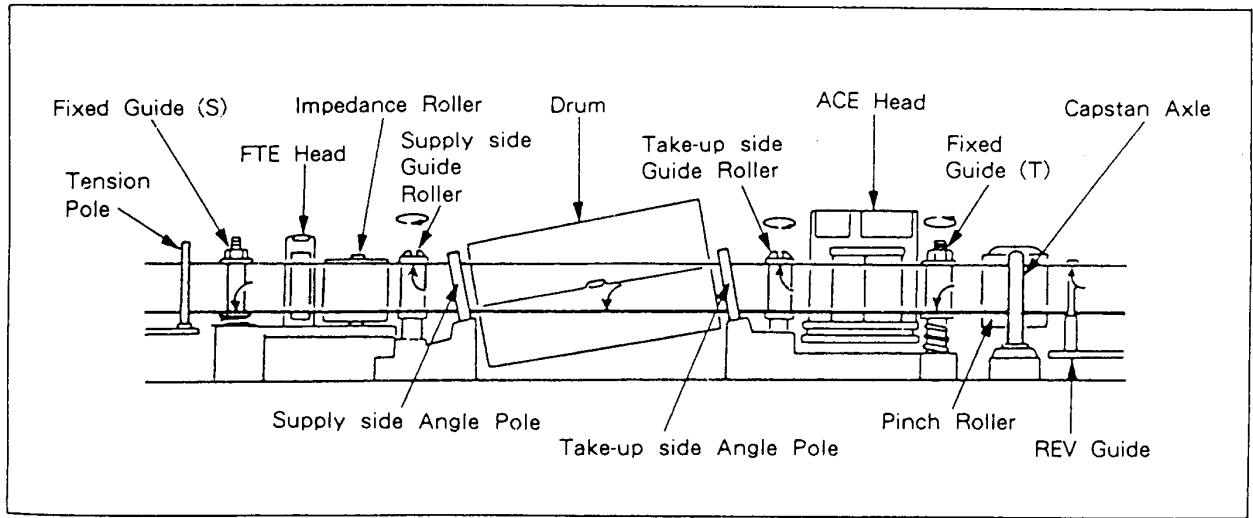


Fig. 6-4-7.